AUTOMOTIVE

Founded 1895

Vol. 75, No. 6

August 8, 1936

INDUSTRIES

This Week

Few seem to realize the extent of distribution of natural gas. That brings up the question of its use for stationary power plants. A discussion of the subject will be found on page 176.

A unique method of measuring spark plug efficiency is described by Earl A. Keeler on page 182. On page 189 there are some data

On page 189 there are some data on crankshaft and connecting rod bearing specifications that are used on American passenger cars. Save it.

Shop equipment manufacturers are out in the open with a number of new developments described on page 190.

Plants Turn to '37 Program

Only Half Dozen Factories Still at Work on '36 Schedules, Others Busy Retooling for New Lines

By Harold E. Gronseth

The motor industry is now well along with its 1937 model program. One of the best indications of the advanced stage of the preparatory work is the fact that pattern shops, which are the first to get the plans from the drafting boards, having about completed their work, are laying off men.

The die making business which is next in line is also believed to have passed its peak as some let-down was noted during the past week. However, die shops recently have been getting some last minute changes which further

denotes the wind-up of this phase of the program. It not infrequently happens that last minute changes are deemed advisable as the plans of competitors become known. Tool shops are still operating at the year's peak and are continuing to hire men. Orders on hand indicate sustained activity in tool departments for some time ahead. The tool and die industry this year is enjoying the best business since 1929, probably reflecting some extensive changes in new models as well as heavier output by the industry.

At least two companies have got under way on 1937 production and two or three more will ease into their new programs before the month is out, but the majority of the car manufacturers will not get into production on new models until September. The first of the new car announcements is scheduled for Sept. 15, with the bulk of announcements coming late in October, or just before the New York show scheduled for Nov. 11.

The half dozen auto plants which remain in production on 1936 cars are (Turn to page 172, please)

Pierce-Arrow to Make House Trailers

Other Companies in Various Industries Also Plan to Enter New Field

A new division of Pierce-Arrow Motor Corp. has been formed to handle production and sale of tourist-type trailers. This is the first automobile manufacturer to enter the field.

Features of the Pierce-Arrow Travelodge, trade name of the new vehicle, include a new type of independent wheel suspension, Bendix hydraulic brakes, Houdaille hydraulic shock absorbers as optional equipment, a recently developed safety hitch, full size wheel housings and special floor construction sealed to exclude dust and drafts from the interior. Particular attention has been given to intelligent arrangement of the interior in order to provide maximum utility and comfort.

All-steel chassis and body frames are built of channel and box section members and welded construction is employed throughout. The outer shell of 18-gage aluminum does not add appreciably to the weight and contributes to the strength and safety of the trailer. To prevent corrosion the steel body frame is painted inside and out before the outer paneling is attached. Insulation against heat, cold and sound is

provided by a 1-in. air pocket between the outer shell and inner lining. The additional protection of an insulating and sound-absorbing compound is applied to the outer shell.

Maximum road clearance and comfortable riding qualities are attributed to the new type of independent wheel suspension. The 12-in. x 2-in. brakes are mounted on a flange of this wheel suspension device. The wheels themselves are of a steel spoke type, 16 in. in diameter with 4½ in. rims capable of taking 6 in. 6½ in. or 7 in. tires. Full size wheel housings facilitate tire changing—a feature which the experienced trailer tourist can appreciate.

The hitch device for attaching the trailer to the towing vehicle is made of triangular shape steel tubing and is fixed to the steel body sills at four points The forward end has a drop forged hinge ball socket with a spring-operated retaining device to eliminate rattles and facilitate rapid detaching of the trailer from the towing car.

the trailer from the towing car.

Distribution of the Travelodge is planned on a national scale, through

(Turn to page 172, please)

Olds to Spend \$6,350,000 To Expand Plant Facilities

Olds Motor Works will spend \$6,-350,000 for expansion of production facilities during the next few months, C. L. McCuen, president, stated in connection with the completion on Aug. 3 of Olds' 200,000th 1936 model. This mark sets a new record for Olds and is an increase of 58 per cent over the total production of 1935 models which was 126,000 cars.

The expansion plans include the stepping up of production capacity from 55 to 85 cars an hour, complete modernization of plant machinery and equipment and the purchase of new tools and dies to speed up department operations. Increased employment over the recent high level is anticipated.

Ford to Make Own Tires?

Rumor Persists that Car Maker Seeks Independence from Threat of Continual Labor Trouble in Akron

To insure regularity of its tire supply, the Ford Motor Co. is considering resumption of the manufacture of a portion of its tire requirements, a policy it discontinued about 13 years ago when the company's manufacturing operations were shifted from Highland Park to the River Rouge plant. Pre-liminary investigations of the tire situation are being made by Ford representatives including surveys of tire making properties in the East and inquiries among tire machinery manufacturers. Some facilities have been maintained at the Ford plant which can be utilized if the company decides to go into tire manufacture.

The move is in line with the Ford policy of making at least a portion of the company's requirements of parts and materials going into the cars. This serves as a check on costs and enables the company to encourage new manufacturing methods. The purpose is not only to insure continuity of supply should interruption occur to the regular flow from any of its sources but it also serves as a check on costs and enables the company to encourage new manufacturing methods. The Ford steel mills, glass plant and coal mines are examples of the carrying out of this policy.

Ford is said to be dissatisfied with the manufacturing methods in the tire industry and the employee relations with management which were disturbed by the N.R.A. and never completely righted. It is understood that Ford believes the motor industry's policy of paying high minimum wages and day rates rather than piece work rates could be adapted to advantage in the tire industry where labor troubles have been a threat to continuity of production.

Firestone has the bulk of the Ford business, with Goodyear and Goodrich sharing about 35 per cent and the United States Rubber Co. of Detroit getting the balance. It is understood the tentative Ford plans call for a plant equipped to produce 24,000 tires per

Britain to Have Super Highways

All public roads in Great Britain have been cared for by local authorities until the present, but now that these roads are being extensively used for long-distance travel this system has proven unsatisfactory, and Mr. Hore-Belisha, Minister of Transport, has just announced a scheme whereby 4500 miles of trunk roads will be turned over to his ministry. A series of standard roads will be built, of from 60 to 160 ft. width, according to density of traffic during peak hours. These roads will accommodate not only motor vehicles but also cyclists and pedestrians.

It is planned to provide these new roads with the best modern features with respect to surfacing, banking and camber, and there will be no level crossings. The Restriction of Ribbon-Development Act, which forbids the erection of buildings within 220 ft. of the center of the highway, will be applied to the new roads. As a result of this program, projects involving the expenditure of £140,000,000 have been submitted by local authorities.—The Engineer, July 17.

Blériot Dead

French Air Pioneer Became Famous by Crossing English Channel

Louis Blériot, pioneer aircraft builder and pilot, died at Paris, Aug. 2, as the result of a heart attack. Blériot achieved his greatest fame by first accomplishing a flight across the English channel in a heavier-than-air machine. He accomplished this feat on July 25, 1909, in a monoplane of 24-ft. span, powered by an Anzani threecylinder, radial, air-cooled engine, and in doing so won a prize of £1,000 offered by The Daily Mail of London.

Blériot was an engineer and a graduate of the Central Polytechnic School of Paris. At the time he made the flight he was 37 years old and was engaged in the manufacture of acetylene



Mr. and Mrs. Edsel Ford, who are spending their vacation in Europe, were photographed recently in a London street.

lamps for automobiles. His interest in aircraft dated back to the last years of the past century, and he built his first full-size plane in 1900. He achieved his first noteworthy success in aviation in 1908 when he flew from Tours to Athenay and back, which is said to have been the first "airplane cross-(Turn to page 170, please)

FTC Issues Rules for Tire Industry

Commission Empowered to Act Against Violations of 12 Clauses Covering Unfair Practices

Fair trade rules for the tire industry, embracing nearly 50 manufacturers, 50,000 independent tire dealers, 45,000 gasoline stations selling tires, 1750 retail stores owned by tire manufacturers and 1400 chain and mailorder stores, were issued Aug. 3 by the Federal Trade Commission which set Aug. 18 as the final date for the filing of objections by members of the industry. The 14 rules as approved and issued coincide closely with the proposed fair trade rules adopted at the industry's trade practice conference held June 4 in Chicago.

Twelve of the proposed rules cover practices designated as unfair trade practices and the commission is empowered to proceed against violators. Two proposed rules come under the commission's "Group II" classification where obedience by members of the industry is purely optional and voluntary. These rules merely condemn certain practices. Rule A in this group condemns the failure to differentiate between wholesale and retail merchandise when both are sold in the same establishment. Rule B sets forth that "it is the judgment of the industry that the members thereof manufacturing pneumatic automobile tires should mark or brand such tires with the words and figures or phrases, molded on or in the rubber of each side wall of such tires, which will unequivocally, conspicuously and truthfully indicate whether such tires are of such manufacturer's first, second, third, fourth or fifth line of tires . . . and truthfully indicate the number of plies in the construction of such tires.

This rule is based upon the application for complaint against the entire industry, filed with the Federal Trade Commission several weeks ago by the National Association of Independent Tire Dealers. Universal opposition upon the part of manufacturers to this

rule is expected.

The 12 proposed rules to which obedience would be legally compulsory, cover price discrimination contrary to Sect. 2 of the Clayton Act as amended by the new Robinson-Patman Act, and standard fair practice rules such as defamation of a competitor, selling below cost, misrepresentation in advertising, false branding, secret rebates and false invoices.

Rule 1 states "Price discrimination contrary to Sect. 2 of the Clayton Act as amended by the Act of Congress approved June 19, 1936, is an unfair trade practice." When this rule was drafted at the industry's June 4 conference it was aimed directly at costplus private brand tire contracts of tire manufacturers with major massdistributors, specifically the Goodyear-Sears contract which had been the subject of a Federal Trade Commission complaint, the Commission having ruled March 5 that the price discrimination under this contract violated the Clayton Act. Goodyear appealed the Commission's ruling to the Federal Courts but on July 16 abruptly terminated its contract to make Sears tires. It has been reported that a group of smaller manufacturers will supply Sears tires in the future, although observers who have studied the provisions of the Robinson-Patman Act express the belief that under this new Federal law it will be difficult for any manufacturer to make his own standard brand tires for dealer distribution, and private brand tires for mass-distributor outlets, and extend such mass distributor any appreciable price discount.

Few manufacturers attended the industry's trade practice conference on June 4. The discussions on the rules as drafted at that time were led by officials of the National Dealer Association.

William I. Ralph Dies

Heart Failure Ends 37 Years with Automotive Publications

William I. Ralph, whose life, for nearly forty years, was devoted to activities connected with automotive business paper publishing, died on Aug. 3 at Atlantic City. "Bill," as he was known to a host of friends in the industry and trade, succumbed to a heart ailment which had afflicted him for the past two years or so.

past two years or so. In 1899 "Bill" Ralph began his career in the publishing field as a subscription solicitor for The Automobile. one of the forerunners of AUTOMOTIVE INDUSTRIES. When The Automobile was bought by the late H. M. Swetland in 1902, and the Class Journal Co. was organized, "Bill" continued with the publication in the capacity of subscription representative. He began his association with the new company by making a two years' trip covering the entire United States. He started with but a few dollars in his pocket and finished with all expenses paid and more than \$2000 deposited in New York banks. His success on that trip earned him a place in the advertising department and his accomplishments



William I. Ralph

soon won for him a vice-presidency in the company.

With the merger of the Class Journal Co. and the Chilton Co., Mr. Ralph became actively identified with the selling of advertising in all of what are now the Chilton publications, Automotive Industries, Automobile Trade Journal, Motor Age, Motor World Wholesale, Commercial Car Journal and the Chilton Automotive Buyers Guide. His life was interwoven with the publishing activities of these periodicals. His chief concern, to the day of his death, was their success.

Stable Motor Employment Achieved

Record of Past 8 Months Shows Variation of Only 6%; Real Wages Highest in Industry's History

Reports summarizing automobile factory 1936 season operations through June, show that during eight consecutive months the number of employees at work in the entire industry re-

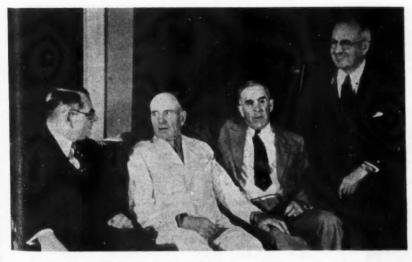
mained steady, without varying as much as 20,000 or six per cent in the period.

This record, resulting from combination of the industry-wide stabilization program undertaken last fall, and the material growth of business, exceeds the stability and continuity of employment experienced by the industry in any previous year of its history, and finds no parallel in strictly comparable industrial operations.

Translated into practical results for a tomobile workers and their families, this year's conditions have brought about an indicated increase of 16 per cent over the 1935 season, in the earnings of the average individual, and an improvement of 52 per cent over earnings of the individual in 1934.

In terms of weekly earnings, the average for all employees during April and May of this year was \$32. Against this is a previous mark of \$35 in the spring of 1929, when, however, the cost of living was so much higher that the wages bought considerably less than the pay envelope of 1936.

The members of the A.M.A. will continue the stabilization program with expectation of repeating the experience of last winter when at least 150,000 persons were kept employed in the automobile and allied plants.



At the Kenosha celebration last week in honor of the 20th anniversary of the founding of Nash Motors—(left to right) C. M. Kaltwasser, president of the Marvel Carburetor Co.; C. W. Nash, chairman of the board, Nash Motors Co.; Fred Cast, Firestone Tire & Rubber Co., and E. H. McCarty, president, Nash Motors Co.

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COUNTERFEIT — Spurious Delco-Remy parts—contact arms, supports, etc.—have appeared on the market, according to the Automotive Parts and Equipment Manufacturers, Inc., and are being sold in various sections of the country. In appearance the counterfeit parts closely resemble the genuine and are packed in "deceptively identical" containers. While Delco-Remy is the only victim of this particular attack, the association warns that it represents an activity on the part of unscrupulous manufacturers which constitutes a threat to every parts maker in the industry.

"THE DRIVER"-First in a series of five text-books for a high school course in driver training is "The Driver," issued by the American Automobile Association. The booklet is based on the experiences of drivers and is aimed to give them a better under-standing of their job and to show the importance of developing sound driving habits when young. Designed primarily for high schools, it has been planned as well for the general public. The four other booklets-"Driver and Pedestrian Responsibilities," "Sound Driving Practices - The Highway," "The Automobile and How to Drive it" and "Highway Traffic, Its Development and Problems," will be ready for distribution in the fall. This new text material is available through the A.A.A. clubs and affiliates throughout the country.

TRIBUTE — Nine Federal taxes imposed on automotive products cost motorists an additional \$13,611,949 during the first six months of 1936, according to figures compiled by the American Petroleum Institute. First half collections this year totaled \$154,500,961 as compared to \$140,889,012 in 1935, a gain of 9.7 per cent. The duplicating Federal sales tax on gasoline was the most costly levy to motor taxpayers, comprising 51.6 per cent of

\$1,000-\$1,500 Class Gains Most

Total Passenger Car Output 10% Above 1935; Truck Production Up 18%

Passenger Car Production by Wholesale Price Classes U. S. and Canada

First Six Months 1936 and 1935 Compared

	1936	1935	Per Cent Change	Per Cent 1936	of Total
			Change		1933
\$500 and under	1.153.016	1.160,751	- 0.5	54.08	59.93
\$501-\$750	873.159	700,607	+24.8	40.95	36.17
\$750-\$1,000	74,304	53,663	+38.4	3.48	2.77
\$1,001-\$1,500	23,453	12,717	+84.2	1.10	.66
\$1,501-\$2,000	5,523	4.747	+16.3	.26	.25
\$2,001-\$3,000	2.584	2,698	-4.1	.12	.14
\$3,001 and over	219	1,645	-86.6	.01	.08
Total	2 132 258	1,936,828	+10.1	100.00	100.00

Truck Production by Capacities U. S. and Canada

First Six Months 1936 and 1935 Compared

			Per Cent	Per Cent	of Total
	1936	1935	Change	1936	1935
1½ tons and !ess 2 to 3 tons 3½ tons and over Special and buses	457,200 19,564 4,100 3,234	370,179 17,058 3,314 2,149	$^{+18.2}_{+15.0}_{+24.0}_{+50.3}$	94.20 4.22 .88 .70	94.27 4.34 .84 .55
Total	464,098	392,700	+18.1	100.00	100.00

total collections. Substantial increases were also noted in the totals of the taxes on automobiles, trucks, tires and inner tubes.

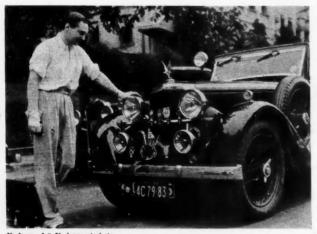
VANDERBILT CUP—The famous old Vanderbilt Cup, last raced for in 1916, is to have its modern replica, the George Vanderbilt Cup, a handsome silver trophy for which the field of international racing stars will compete in the 400-mi. inaugural at Roosevelt Raceway, Long Island, Oct. 12. George Vanderbilt, donor of the new cup, is a nephew of William K. Vanderbilt, who gave the original trophy as the prize for one of the greatest sporting events of a generation ago.

TRAVELING LIBRARIES—The Garden Book Shop, 2127 Mission St., San Francisco, Calif., offers to cooperate with the makers of house trailers by paying one-half the wholesale cost of

100 to 300 books which any of their customers may purchase to establish a traveling library or bookshop. The amount thus advanced by the Garden shop may be refunded within one year.

Auto-Lite Enters Spark-Plug Field

The Electric Auto-Lite Co., Toledo, manufacturer of electrical equipment for automobiles, has taken up the manufacture of spark plugs. The new plug, which has been in use experimentally for some time, is made of newly-developed materials, the electrodes being made of an alloy known as Konium and the insulator of Ziramic, a formula developed by Auto-Lite. It is stated that the "electric eye" is used to assure accuracy of spark-gap setting. The plugs will soon be available through official Auto-Lite service stations and other retail outlets.



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British Motorists End 12-Day American Tour

A remarkable collection of emblems is displayed on his car by Joseph R. Edwards, London chemical manufacturer, who is a member of the British Junior Car Club caravan now touring the eastern United States and Canada.

The 12-day automobile tour of members of the British Junior Car Club through several eastern States and a part of Canada ended when the party embarked at Montreal on Friday. After landing at New York and visiting Washington, Cleveland and points of interest en route, the group spent Sunday in Detroit. The Ford Rouge plant was shown the visitors in the morning and after lunch at Dearborn Inn they spent the afternoon in Greenfield Village. From Detroit the caravan went to Niagara Falls, then to Toronto and Ottawa and finally Montreal.

GM and Ford Spanish Plants Seized

Properties Reported Undamaged by Civil Strife, American Officials Are Safe

News of the seizure of its Barcelona plant was received early this week by General Motors Export in New York, and was later confirmed to the corporation by the State Department. All of the American personnel attached to the Spanish branch is reported to be safe and most of them have left the country. Shipments of parts were stopped as soon as hostilities broke out. G. M. officials are keeping in close touch with the situation both by wireless telephone and through the State Department.

In Detroit this week an official of the



WILLARD D. EAKIN, recently resigned as assistant secretary and patent counsel of the B. F. Goodrich Co., will engage in the general practice of patent and trademark law at 508 National Building, Akron, Ohio,

V. FLETCHER HARPER has resigned his position with the Allis-Chalmers Mfg. Co., Milwaukee, and is now associated with the G'obe-Union Mfg. Co. of the same city. Mr. Harper was president of the American Society for Steel Treating in 1927 and is well-known for his articles on metallurgy.

HERBERT N. FORSBERG, for many years with the Geuder, Paeschke & Frey Co., Milwaukee, has been appointed sales manager of the contract manufacturing division to fill the vacancy caused by the death of Louis Reinhard.

CHESTER J. ROBERTS, who has been connected with the Four-Wheel Drive Auto Co., at the main plant in Clintonville, Wis., has been appointed manager of his company's Milwaukee branch.

H. BORNSTEIN, of Deere & Co., Moline, Ill., was elected vice-president of the American Foundrymen's Association at the annual meeting of the association's directors in Cleveland last week.

JAMES R. ALLEN, of the International Harvester Co., Chicago, Ill., was named a member of the board, term expiring in 1939, of the American Foundrymen's Association at the annual meeting of the association's directors in Cleveland last week.

RONALD K. EVANS, who has been general manager of the General Motors Adam Opel factory in Germany since 1929, has been named a vice-president of the corporation. Born at Big Rapids, Mich., Aug. 17, 1889, Mr. Evans has been with General Motors export in various capacities since 1924. Mr. Evans has resigned his position with Opel and will be assigned to domestic duties.

R. H. DAISLEY, has been appointed assistant general manager of the Wilcox-Rich Corp., Detroit. Mr. Daisley has long been associated with the corporation, particularly with the Saginaw plant, in engineering, sales and manufacturing capacities.

Ford Motors Co. stated that they have had no news for some time from their representative in Spain.

The State Department is awaiting official reports from its representatives in Spain before taking any action regarding seizure by the Spanish government of the Ford and General Motors assembly plants in Barcelona and other American property. It was said that the department upon receipt of such reports would take whatever action it deemed proper.

An account of events in Barcelona up to July 27, received from the correspondent of AUTOMOTIVE INDUSTRIES in that city, follows:

Wives and families of officials and major American employees of General Motors Peninsular, Barcelona, sailed on the American export liner which had been ordered here from Marseilles by the U.S. Department of State to embark 160 Americans and other nationals. The General Motors group sailing comprised: Angela K. Hill, of Antwerp, wife of John E. Hill, treasurer; Alice C., wife, and Caroline C. and Alice C., of New York City, daughters of Charles G. Quinlan, local manager of General Motors Acceptance Corp.; Marjorie R., wife, and Maria L., daughter of Paul Iddings, both of Kendalville, Ind.; and Philip E. West and his wife, Mary Starr West, and daughters, Lydia Ann and Mary Luella, and son, Philip, II.

Even among the most radical anarchist and syndicalist groups current sentiment favors a slow approach to any "reforms," as witness an editorial in Solidaridad Obrera, one of the leading extreme Left organs, which counsels: "No reforms for the present; our present task is to crush Fascism; until that is accomplished we must think of nothing else!" As the national and regional governments of Spain and Catalonia are rapidly obtaining control of the situation, it is not now believed the contemplated reforms will be more elastic than the advanced labor measures to which the recent national and local elections establishing the "Frente Popular" (People's Front) automatically committed

Americans and the properties of both individuals and corporations are being scrupulously respected by the governmental and syndicalist police and military forces, and the American Consulate General is being accorded every facility and courtesy by the constituted authorities.

In the first days of the outbreak the private motor cars of all residents, American, Spanish, Catalan and foreign, were commandeered by the government and syndicalist defending forces. The rough usage to which these thousands of vehicles and hundreds of motor



Ronald K. Evans, named a vice-president of General Motors Corp.

trucks have subsequently been subjected, including many attacks in which fusilades of rifle and revolver fire were exchanged, have left 85 per cent of the automotive equipment of Barcelona and its environs hors de combat and insures a good market for new cars when the hostilities shall have ceased—and with no remotest prospect of "trade-ins."

Poxson to Head Reo Sales, G. E. Smith Also Promoted

Don E. Bates, president and general manager of the Reo Motor Car Co., has announced that George E. Smith, vice-president and purchasing manager, has been named assistant general manager. Mr. Bates also announces that domestic sales activities have been transferred to the Reo Sales Corp., under Elijah G. Poxson, president, who now will have charge of both foreign and domestic sales.

A number of other personnel changes have been made. C. A. Triphagen, formerly sales manager, has resigned, while T. F. Cullen has been named advertising manager, and Charles Boutelle has been placed in charge of domestic sales under Mr. Poxson.

Mr. Smith was one of the founders of the Reo Motor Car Co. in 1904 and he has been purchasing manager since Reo was first organized. He has been a director of the company for almost 30 years and he was elected vice-president two years ago. In his new position he will take over many of the management responsibilities and will continue to supervise all purchasing activities.

Mr. Poxson was connected with the automobile business for several years before coming with Reo in 1924 as manager of the Reo Speed Wagon division. Later he was made assistant general sales manager, then general sales manager and in 1934 was elected president of the Reo Sales Corp.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES

Another gain in business activity was reported last week, and many branches of trade registered a new high for the current movement. Fall buying at wholesale was the largest since recovery began. The commodity markets continued their upward trend, with the sharpest increase in corn. The Government has announced that half of the corn crop in six important states has been damaged beyond recovery by the drought.

Business Steady in June

According to the Board of Governors of the Federal Reserve System, production, employment, and trade during June were sustained at the May level, although there is usually a seasonal decline in that month. The board's seasonally adjusted index for June stood at 105, based on the 1923-25 average as 100, as compared with 101 for May.

Business Best Since October, 1930

A report issued by the United States Chamber of Commerce states that manufacturing activity and employment are higher than at any time since October, 1930. The report offers the opinion that the physical volume of business this year will be the largest since 1929.

Carloadings Still Rising

Railway freight loadings during the week ended July 25 amounted to 731,062 cars, which marks an increase of 10,660 cars above those during the preceding week, a gain of 135,490 cars above those a year ago, and an increase of 121,020 cars above those two years ago.

Payrolls Mount Since January

According to the Bureau of Laber Statistics, June marks the fourth consecutive month in which gains in manufacturing and non-manufacturing industries have been recorded. Tota' payrolls in these industries have shown monthly increases since January.

Lumber Output Steady

Lumber production during the week ended July 18 was 69 per cent of the 1929 weekly average and was three per cent above that during the preceding week. Shipments increased five per cent, and new orders were four per cent higher.

Fisher's Index

Professor Fisher's index of wholesale commodity prices during the week ended Aug. 1 stood at 83.7, as against 83.2 the week before and 83.3 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended July 29 showed an increase of \$1,000,000 in holdings of discounted bills. Bills bought in the open market and government securities remained unchanged. Money in circulation declined \$30,000,000, and the monetary gold stock increased \$8,000,000.

Many honors were heaped upon Blériot. He was made a chevalier of the Legion of Honor three days before he accomplished the Channel flight. After landing at Calais he went to London and was there feted in grand style, leading British statesmen taking part in the festivities. Returning to France, he received a very enthusiastic welcome in which President Fallières participated.

M. Blériot was a founder-member of the International Aeronautic Federation and he held pilot license No. 1, No. 2 being held by Glenn Curtiss. At the first international air race held at Rheims in 1909 a Blériot plane finished second, behind the winning Curtiss plane. During that same year Blériot also gave flight exhibitions in Vienna, Budapest, and finally at Constantinople.

In 1931, Blériot offered a prize for the first airplane that should attain a speed of 1000 km. (about 620 miles) per hour. This has not yet been accomplished.

Blériot was born in Paris in 1872.

New Car Financing Was 77% Higher in June

The dollar volume of retail financing of new passenger automobiles shows an increase of 77 per cent for the month of June as compared with June, 1935, and an increase of 80 per cent compared with June, 1934, according to preliminary estimates by the Department of Commerce. As compared with May, 1936, there was an increase of one and one-half per cent.

The aggregate volume for the first six months of this year was 60 per cent above the first six months of 1935 and 94 per cent higher than for the corre-

sponding period of 1934.

Blériot Dead

(Continued from page 166)

country trip" ever made. His countrymen were greatly elated at this success and erected a monument in his honor. Later he made another trip of greater length, and on July 4, 1909, he remained in the air for 50 minutes 8 seconds.

Another famous aviator of that period was Hubert Latham, a Frenchman of English extraction. Latham was the first to try the channel flight, but failed, and this induced Blériot to try the flight. Only a week previously one of his machines had caught fire and he had seriously burned his foot, which compelled him to use a crutch when he prepared for the flight at Calais. A French destroyer was to accompany the aviator, but, as might have been expected, he far outdistanced it.

The monoplane in which the channel crossing was accomplished was one of the smallest and lightest planes ever

built, weighing only little over 400 lb. The radial engine was mounted between the wings and carried the propeller on a forward extension of its crankshaft, so the plane was of the tractor type. The operator sat in a skiff-like body or fuselage back of the engine. Control was by a single lever which moved in the fore-and-aft direction to lower or raise the nose of the machine, and sideways for steering. The plane had a wooden framework covered with a fabric similar to vellum in appearance.

Blériot was a very daring pilot and had a series of accidents in quick succession. In December, 1909, he crashed on the top of a house in Constantinople and broke three ribs. This induced him to give up flying and to devote himself to the technical development of the aircraft thereafter. His aircraft factory at Suresnes, a suburb of Paris, was greatly expanded during the war, when it produced not only planes of Blériot design, but also a model known as the Spad.

40 Years Ago

with the ancestors of AUTOMOTIVE INDUSTRIES

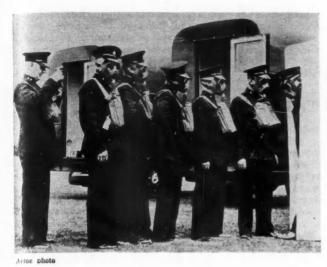
Foreign Notes

James Gordon Bennett has subscribed 10,000 francs to the fund for the Paris-Marseilles race.

Emil Roger & Co. of Paris is about to float an English company with a capital of £300,000 for the promotion of Roger's motors and vehicles. It is proposed to establish a factory in England and form subsidiary companies in other countries.

A foreign contemporary states that the leading French builders of motor carriages are experimenting with horizontal motors in the belief that many of the defects in their vehicles can be remedied by the use of a motor of this type.

-From The Horseless Age, August, 1896.



Mobile gas chambers, mounted on trucks, are making a tour of Great Britain to prove to the public the efficacy of the new gas masks being issued. London police officers wearing the masks are here seen entering the gas chambers.

Datsun Sales Rise

Increasing popularity of the Japanese Datsun is evidenced by the fact that a new high record for registrations was established last month, with a total of 550 passenger cars and trucks. This surpasses the figure for May by nearly 10 per cent. The highest monthly registration last year was in December with 409 cars. Passenger car and truck sales were about equal.

In addition to its small car program,

the Datsun company announces a plan to produce passenger cars of the Chevrolet-Ford class as well as motor-trucks on a scale of about 5000 units per year increasing to 10,000 soon.

The company has filed application with the Japanese Commerce Department for a license. Financing has been arranged with a group of Japanese banks, it is reported. The banks will advance a 6,000,000 yen new loan to the Nissan Jidosha in addition to the outstanding loan of 3,000,000 yen.

Service Training Courses To Open at GM Institute

Opportunities for General Motors dealers to train young men for responsible positions in their service departments are again being provided by the General Motors Institute in Flint, Mich., with the announcement of the details for next year's cooperative training program. The course opens Aug. 31 at the institute and applications are now being accepted. There are still a few openings in the fall class, according to Major Albert Sobey, director of the institute. Enrollments open to any young man, preferably with high school education, who intends to make the sales and service of motor cars his life work.

The courses offered cover various phases of service station operation and automotive mechanics under expert instruction, outlined and approved by the service managers of General Motors car divisions.

divisions.

James E. Austin

James E. Austin, manufacturer of the Austin Automobile during the early years of the industry in this country, died at Grand Rapids, Mich., last Sunday. He was 95 years old. With his son, Walter, Mr. Austin started building his car in a factory at Grand Rapids in 1901 and continued operations for 17 years.

Motor Vehicle Exports Gain 8% in First Six Months

Exports and Imports of the Automotive Industry for June and Six Months Ended June, 1936-1935

EXPORTS	10	Jur		935	Six Months Ended June								
Motor Vehicles, parts and accessories	Number	Value \$19,135,445	Number	Value \$20,070,235	Number	Value \$132,820,215	Number	Value \$123,447,273					
PASSENGER CARS													
Passenger cars and chassis Low price range \$850 inclusive Medium price range over \$850 to \$1,200 \$1,200 to \$2,000 Over \$2,000	14,805 13,804 758 166 77	8,123,099 6,945,858 731,795 243,919 201,527	16,517 15,368 893 105 48	8,936,902 7,793,408 831,084 153,671 115,792	100,473 92,042 6,864 1,059 508	57,224,066 47,749,382 6,605,114 1,552,448 1,317,122	95,548 88,516 5,217 778 488	53,382,222 45,719,226 4,960,080 1,191,289 1,290,357					
COMMERCIAL VEHICLES													
Motor trucks, buses and chassis (total) Under one ton One and up to 1½ tons Over 1½ tons to 2½ tons Over 2½ tons Bus chassis	9,029 1,764 5,863 1,144 228 30	4,727,273 675,029 2,603,977 868,201 544,504 35,562	862 7,548 1,101 185 33	4,813,765 279,639 3,380,672 830,456 262,051 45,246	57,718 9,003 37,780 7,660 1,690 1,585	29,083,841 3,389,286 17,202,049 5,456,298 2,346,161 690,047	3,961 34,440 6,468 1,126	23,929,632 1,321,871 15,388,191 4,990,698 1,963,858 183,748					
PARTS, ETC.													
Parts except engines and tires Automobile unit assemblies Automobile parts for replacement (n.e.s) Automobile accessories (n.e.s) Automobile service appliances Airplanes, seaplanes and other aircraft Parts of airplanes, except engines and tires.		2,683,334 2,372,591 269,715 391,180 2,036,124 511,010	15	3,409,551 2,126,143 201,767 273,870 214,016 513,018	227	25,436,525 13,191,212 1,650,123 2,192,941 4,577,099 2,351,213	182	27,814,398 12,690,653 1,513,075 2,105,090 4,476,969 2,438,337					
INTERNAL COMBUSTION ENGINES													
Stationary & Portable Diesel and semi-Diesel	38	74,255	24	87,620	200	623,347	147	399,658					
Not over 10 hp		50,582 60,346	1,225 151	50,960 68,879		353,435 471,757	4,856 676	271,842 389,290					
Automobile engines for: Motor trucks and buses Passenger cars Engines and aircraft Accessories and parts (carburetors)	4,117	196,079 290,506 195,100 159,563	1,845	45,095 119,956 173,340 162,252	29,729	2,023,888 1,453,495	17,424 252	1,108,424 906,899					
IMPORTS													
Automobile and chassis (dutiable)	83	53,101	56	21,334	357	169,813	259	132,968					

Plants Turn to '37 Program

(Continued from page 165)

turning out a substantial volume since the group includes the three major producers and two others with good sized output. With retail demand holding steady the factories do not find it necessary to taper off gradually but will maintain a comparatively high rate of production right up to closing time. By the end of August the 1936 run of cars will be practically completed. The industry's output will drop to the lowest point so far this year during the current week when Ford Motors closes for inventory, reopening again on current models Aug. 17.

Reports from the field covering the final week or ten days of July show some recovery in sales from the midmonth level which reflected the effect on the retail market of the heat wave that swept the country. Final figures for July should show deliveries of some 395,000 cars and trucks or about 12 per

cent under the June volume.

Sales of Buick cars are running unusually heavy during the summer months, deliveries during July having been the largest experienced by the company during this month in seven year. A total of 14,724 new cars were delivered at retail to customers in the U. S. as compared with 16,354 in June and 6002 in July a year ago. This was a decline of approximately 10 per cent from June, less than the average drop for this season, and a gain of 145 per cent over July, 1935.

Chevrolet's ten assembly plants in the United States achieved the second highest July production in the company's history last month with a total of 125,391 units. This is only 3059 units under the all-time single month's production record established in June. World production in July included 9066 units shipped overseas for assembly and 2476 units built in Canada, making a grand total of 136,933 for the month.

Sales of Hudsons and Terraplanes for the three weeks ending July 25 continued at the highest level since 1929, totaling 6742 cars in the United States alone as compared with 4577 for the

same period a year ago.

Studebaker truck sales for the first six months of 1936 reached the all-time high mark of 3820 units compared with 2473 for the same period in 1935—a gain of 54 per cent. Retail deliveries of Studebaker passenger cars for the first 20 days of July in the United States totaled 3383, an increase of 44 per cent over the corresponding period of 1935.

Continental Motors Corp. announces the receipt of what is said to be the largest order for commercial aircraft engines ever placed in the United States. This order, placed by Taylor Aircraft Co., of Bradford, Pa., calls for 1050 model A-40 4-cylinder opposed type aircraft engines. They are for use in the Taylor Cub, a popular two-seated sport plane.

Chevrolet Motors Ohio Co., makers

of transmissions, announced that it would close Aug. 7 for annual inventory and rearrangement of machinery for the 1937 production season. Employees were notified that the plant would be shut down from four to six weeks.

Pierce-Arrow Trailers

(Continued from page 165)

automobile dealers, garages, service station and independent outlets. Production is already well under way and the first shipments to dealers are scheduled for the first week in September.

Production of steel bodied trailers or house cars will be started in September by the Edwards Iron Works, South Bend. Designs for standard and de luxe models have been completed by Ralph H. Wise, Detroit. Models are expected to be ready for exhibition at the fall shows.

It is reported that the Federal Motor Truck Co. has developed a new house trailer which will be announced within a few days.

The Ozark Corp., Helena, Ark., makers of barrels and wood products, has also brought out a line of house trailers, according to *Printer's Ink.*

The Aladdin Co., Bay City, Mich., and Portland, Ore., announce the acquisition of an additional factory at Bay City to increase its facilities for building house trailers. This brings Alad-

din's total manufacturing space at Bay City and Portland to 250,000 sq. ft., and, with the 45 acres of property upon which present plants are located in both cities, provides ample room for expansion without interfering with production schedules.

The appointment of K. M. Schaefer as general sales manager of Aladdin's trailer division has been announced. Until recently Mr. Schaefer was city district sales manager at Detroit for

the Pontiac Motor Co.

Bendix Makes Radio Tester

Radio Products Corp., a new subsidiary of Bendix Products Corp., has been announced by Vincent Bendix. It will manufacture a new invention, the Bendix-Dayrad testing unit for automobile radios. The new Bendix-Dayrad unit will be able to detect the weak spots not only in the radio but in the ignition system of the car, it is claimed.

Correction Note

Through a misunderstanding, an illustration of a threading machine which appeared at the top of p. 145 in our issue of Aug. 1 was identified as an H. & G. product. The machine was actually a Landmaco, with hardened and ground die head set up for threading a main shaft, and is a product of the Landis Machine Co., Waynesboro, Pa.

Registrations Gain 26% in First Half

Higher Priced Makes Lead in Percentage Gains; Independents's Share Rises To Nearly 9%

New Passenger Car Registrations

				Six M	onths	Per Cent Change, 6 Mes.	Numerical Change, 6 Mos.	Per Cent	
	June 1936	May 1936	June 1935	1936	1935	1936 over 1935	1936 over 1935	1936	1935
hevrolet	102,949	109.598	66,054	528.300	312, 164	+ 69.2	216, 136	28.51	21.35
ord.	80.527	85, 209	83,273	415,777	488,468	- 14.7	-72,691	22.44	33.41
lymouth	54,009	55,637	40,263	260,010	213,057	+ 22.0	46,953	14.03	14.57
odge	26,841	27,832	18,693	130,593	97,923	+ 34.9	33,670	7.05	6.6
ldsmobile	21,556	23,956	16,421	108,742	80,440	+ 35.2	28,302	5.87	5.50
ontiac	19.537	20,406	14,978	91.849	75, 124	+ 22.1	16,725	4.96	5.14
uick	16, 174	17,950	6,758	82,000	34.076	+141.0	47,924	4.43	2.33
erraplane	8.802	9,535	5,704	42,937	28,841	+ 49.0	14.096	2.32	1.9
tudebaker	7,187	7.657	3,966	35,464	21.076	+ 68.5	14.388	1.91	1.4
hrysler	5,915	6,603	4,778	30,627	24,052	+ 27.6	6.575	1.65	1.6
ackard	5.518	6.302	4,313	28,703	13, 220	+117.5	15,483	1.55	9
e Sete	5, 280	4,655	2,917	21,579	14, 260	+ 51.4	7.319	1.16	. 9
udson	1,987	2,611	2,192	12.315	11.647	+ 5.8	668	.66	.80
ash	2,258	2,676	2, 192	12,070	8,333	+ 45.0	3,737	.65	.5
a Fayette	2,230	2,495	1,264	10,803	7,742		3.061	.58	.5
raham	1,837	2,493		8,492			216	. 46	.5
ramam		1.367	1,728		8,276	+ 2.6 +602.0			.0
incoln	1,243		159	6,526	930		5,596	.35	
a Salle	1,097	1,394	1,403	6,261	5,648	+ 11.1	613	.34	.3
Villys	1,539	1,309	1,062	6,129	4,873	+ 26.0	1,256	.33	.3
adillac	1,035	1,209	529	6,074	2,665	+128.0	3,409	.33	.1
eo	361	415	411	1,926	1,979	- 2.6	-53	.10	.1
lupmobile	119	176	724	1,342	4,335	- 69.0	-2,993	.07	.3
uburn	167	284	495	1,289	3,011	- 57.2	-1,722	.07	.2
ord	162	169		568	********	*******	568	.03	
ierce-Arrow	59	76	80	407	378	+ 7.9	29	.02	.0
discellaneous	954	1,208	51	2,298	418	+450.0	1,880	.13	.0
Total	369,423	392,750	280,360	1,853,081	1,461,936	+ 26.9	391,145	100.00	100.0
hrysler Corp	92,045	94,727	66,651	442,809	348, 292	+ 27.0	94,517	23.90	23.8
ord and Lincoln	81,770	86,576	83,432	422,303	489.398	- 13.6	-67.095	22.79	33.4
eneral Moters	162,348	174.513	106, 143	823, 226	510, 117	+ 61.2	313, 109	44.42	34.8
Il Others	33,260	36,934	24, 134	164.743	114, 129	+ 44.0	50.614	8.89	7.8

New Cutting Alloy

Michigan Tool to Market Crobalt for Cast Iron Cutting

"Crobalt," the cutting alloy which has just been placed on the market in bulk and in individual cutting tools by Michigan Tool Co., Detroit, Mich., has been in limited production in the Detroit area during the past two years and has found application in several large plants for lower cost, higher speed, cutting of cast irons.

Crobalt is a non-ferrous, speed cutting alloy whose major ingredients, tungsten, cobalt and chromium are combined with certain other constituents. The alloy is melted in electric furnaces and cast in permanent molds at temperatures of around 3000° F. It is said that its qualities are not affected by cooling after pre-heating to any temperature below that of its melting point (2800° F.).

Tools made of Crobalt are said to have good free-cutting properties. In one large plant, the material has been used for cutting of steels although it was originally developed for cutting cast irons. Productivity per grind apparently is not affected within a wide range by cutting speed or tool temperature. This makes possible a marked stepping up of production per hour without sacrificing tool life. Cutting speeds up to three times those conventionally used with high speed steels have been found to represent a good average in the cutting of cast irons, the best operating speed depending, of course, upon the character of the ma-terial being cut, the type and age of machines, etc.

In general, the field for the new material comprises a wide range between relatively short-lived high speed steels and high cost cemented tungsten carbides, although of course not offered as a substitute for the latter. For turning and boring operations for instance, Crobalt is ideally adapted to roughing and semi-finishing but it is not recommended where it is desired to obtain the extremely highly polished surfaces commonly produced with tungsten

Vacuum Gear Shifting Device Announced by Evans Products

Evans Products Co., Detroit, announced this week that they are placing on market the Evans Auto-Shift, a vacuum device for remote control of transmission gear shifting, designed to eliminate the gear shift lever and facilitate speed change. The device has been acquired by Evans from the Automatic Shifters Co., where it was developed by E. G. Hill and H. W. Hey.

The shifting element consists of a bracket mounted on the steering column directly under the wheel and shifts are effected at the option of the operator by moving a small lever in an H-slot. The entire operating mechanism is vacuum suspended and operates by vacuum power. Three main valves and

a cross operating valve, all of poppet type, in conjunction with a power cylinder comprise the major elements of the installation. One of the principal features of the device is that of providing pre-selective gear changes. It is possible for the operator to move the shifting finger to any given speed position while in gear, the shift being made automatically in the transmission immediately upon depressing the clutch.

According to the manufacturer, the Auto-Shifter is a very compact unit which can be mounted directly on the transmission case. It can be supplied as standard equipment or as an attachment for conventional or synchro-mesh

Motor Union Claims 100% Member Gain Since April

The United Automobile Workers International Union has increased its membership more than 100 per cent since April, Homer Martin, president, stated after receiving reports from officers attending the general executive board's meeting in Detroit during the past week. It was the first quarterly meeting of the board since the convention last April in South Bend when the international union was granted autonomy from the executive council of the A. F. of L.

At that time officers reported that taxes were being paid to the A. F. of L. on 40,000 members. Since then, 40 new charters have been issued to locals, bringing the total to more than 160. The increase includes approximately 30 locals from independent unions which amalgamated with the U. A. W. Reports were received at the meeting on the progress of the organization's drive in the automobile industry and plans for its continuation were considered. Formal affiliation with the John L. Lewis Committee for Industrial Organization was ratified by the board on Monday, when a telegram was sent to William Green, A. F. of L. president, and to the A. F. of L. executive coun-The board accepted an invitation of Frank X. Martel, president of the Detroit and Wayne County federation of labor, to attend the first meeting of Labor's Nonpartisan League in Lansing Thursday. The league, headed by Major George L. Berry, is working to reelect President Roosevelt.

Homer Martin has called a meeting of all U. A. W. locals in Michigan for Sept. 6 at Island Lake at which Frank Murphy, commissioner to the Philippines and Democratic candidate for Governor of Michigan, will be the principal speaker. The purpose of the meeting is to cement friendship among the

AAA Sanctions Pike's Peak Climb

Sanction for a Pike's Peak climb on Labor Day was issued Thursday by the Contest Board of the American Automobile Association. Details were not available, but in other years two classes of cars, stock and racing, com-

GM Declares Extra

Half Year Dividends Reach \$3 Bendix Pays 50 Cents

General Motors Corp. directors declared an extra dividend of 75 cents a share with the regular quarterly dividend of 50 cents a share and the regular quarterly payment of \$1.25 on the \$5 preferred stock. It was the second 75-cent extra this year, the first having been paid on June 12.

The payments will raise total distributions for the year thus far to \$3 a share, against the half-year net income of \$3.17 recently reported. In 1935 a total of \$2.25 a share was paid.

Improvement in fields allied to the automobile companies was also indi-cated when Collins & Aikman Corp., suppliers of body fabrics, declared an extra dividend of \$1 with the regular quarterly payment of 50 cents. The company also called one-fifth of the 61,108 shares 7 per cent preferred issue. Call price is 110.

Bendix Aviation Corp. declared a dividend of 50 cents against 25 cents previously. Vincent Bendix, president, stated that regular dividends as a policy have been discontinued due to the effects of the new tax law providing for levies on undistributed profits of corporations. Dividends will be declared when and as earnings permit.

Mack Trucks, Inc., reported net income for the June quarter of \$404,412. or 67 cents a share, against \$107,477, or 18 cents a share, in the March quarter against a net loss of \$132,015 for the second three months of 1935. For the first half of the year the net income was \$511,889, or 85 cents a share. comparing with a 1935 net loss of \$319,-

No AMA Banquet During Show

It has been decided that the Automobile Manufacturers Association will not hold a banquet during the New York automobile show, thus continuing the practice of the past two years.

New York morning papers are planning special show issues for both Sunday, Nov. 8, preceding the show, and Sunday, Nov. 15, during the show. Evening papers will print special show editions on Tuesday, Nov. 10, the day before the show opens.

Graham-Paige Moves Body Works

As part of a program of consolidating operations, Graham-Paige Corp. is moving body building operations from its Wayne, Mich., plant to the main factory in Detroit, a step which will result in substantially lower overhead costs and transport charges. Operations at the main plant are being readjusted to permit producing 30 cars

an hour against 23 formerly. Factory sales of Graham cars during the first six months of 1936 totaled 12,599 against 14,127 in the same period last year. July shipments of 1577 units compared with 1341 a year

Automotive Metal Markets

Last Minute Steel Buying for Current Models Overlaps Initial Purchases for 1937 Lines

By William Crawford Hirsch

Billings to automotive consumers by steel producers continue to exceed all expectations. New business, for the most part accompanied by specifications and in many instances by requests for rush shipments, is more or less of the odd lot sort with individual orders representing little in a tonnage way, but in the aggregate sufficient to puncture the fallacy of inevitable midsummer dullness.

The overlapping of last-minute buying of steel for current models and of initial purchases for the try-out period of new model production is somewhat, of an innovation in the steel market. Some of the automobile sheet specialists have enough business on their books to relieve them of all anxiety regarding production schedules over the next six weeks.

Demand for cold rolled strip steel is

relatively heavy. Whether this is due to the fact that prices for this description were not marked up, while those for cold rolled sheets were, is a moot question. Some of the second quarter commitments in hot rolled strip steel at a saving of \$2 per ton, compared with the current price, still make up a considerable part of shipments by mills. In some instances buyers have asked that specifications, carrying the \$2 per ton advance, be put ahead because this material was more urgently needed than the other. Quite a few parts makers are expected to place tonnage orders as soon as they have definite information on parts specifications.

Automotive alloy steels come in for good inquiry. Higher prices for bolts and nuts went into effect with the beginning of August. Manufacturers say that they have booked quite a little business at the higher levels in the last few days. Relatively little protective buying was noted in bolts and nuts during the period of lower prices, consumers apparently preferring to adhere to their routine purchasing methods,

Pig Iron—Markets are marking time pending resumption of melts on a larger scale by automotive foundries. Blast fur-nace operations proceed at a high rate, res-flecting general confidence in the outlook, Prices are unchanged and appear to be satisfactory to both producers and

Aluminum—Steady with the automotive demand for both primary and secondary metal and alloys rather light.

metal and alloys rather light.

Copper—Foreign producers of copper let it be known this week that they plan to lift their production quotas by approximately seven per cent, beginning with Aug. I. This means that the export price of copper has now reached a point where South African and South American producers no longer consider extreme curtailment of output necessary. This should have a restraining influence on the domestic market, which rules extremely quiet at the new 9%-cent level.

Tim—With the London market closed on Monday because of the August bank holiday, activity here was virtually nil and the week's opening price of 43 cents for spot Straits strict'y nominal. The supply here and abroad is reported by the latest statistics to be critically short.

Lead—Reports of the coming onto the market of a new storage battery that will last for the lifetime of an automobile came in for much comment. The poundage of lead used in this battery exceeds that in the conventional batteries of today, but its long life would cut down lead consumption on the whole. The market is active and firm

Zinc-Quiet and steady.

Calendar of Coming Events

Automobile Salon, Oriental Fair, Lwow,
PolandSept. 5-15

International Automobile Section, 7th
Levant Fair, Bari, ItalySept. 6-21 Levant Fair, Bari, 1621, 1621, 2011, 30th Automobile Salon, Paris, France, Oct. 1-11 Olympia Motor Show, London, England, Oct. 15-24 Czechoslovakia, 26th International Automobile Exposition, Prague....Oct. 16-25 International Automobile Salon, Boston Automobile Show......Nov. 14-21
Buffalo Automobile ShowNov. 14-21 Columbus Automobile Show.....Nov. 14-20 Chicago Automobile Show.....Nov. 14-21 Detroit Automobile Show......Nov. 14-21 Washington, D. C., Automobile Show, Nov. 14-21 Cincinnati Automobile Show....Nov. 15-21 St. Louis Automobile Show.....Nov. 15-22 Philadelphia Automobile Show, Pittsburgh Automobile Show ... Nov. 16-21 Brooklyn Automobile Show.....Nov. 21-28 Cleveland Automobile Show.....Nov. 21-28 Montreal Automobile Show Nov. 21-28 Kansas City Automobile Show..Nov. 21-29* Milwaukee Automobile Show...Nov. 22-29

Raltimore Automobile Show, Nov. 26-Dec. 5

• Tentative dates.

CONVENTIONS AND MEETINGS National Association Power Engineers, Annual Meeting, Chicago, Aug. 31-Sept. 4 American Chemical Society, Semi-an-nual Meeting, Pittsburgh, Pa., Sept. 7-12 Annual Meeting and Convention of the National Association of Sales Finance Companies, Hot Springs, Va.Sept. 14-16 American Transit Association, Convention, White Sulphur Springs, W. Va.Sept. 21-24

American Society for Metals, 18th Nat'l Congress, Cleveland, O.....Oct. 19-23 16th Annual Meeting of the American Welding Society, Cleveland, O., Oct. 19-23 erican Gas Association, Annual Meeting, Atlantic City.....Oct. 26-31

Meeting, Atlantic City.....Oct. 26-31

American Petroleum Institute, Annual
Meeting, Chicago.....Nov. 9-12

National Foreign Trade Convention,
Chicago.....Nov. 18-20

16th Annual Meeting, Highway Research
Board of the National Research
Council, Washington, D. C...Nov. 18-20

Nati Industrial Traffic League Annual

Natl. Industrial Traffic League, Annual Meeting, New York City....Nov. 19-20

CONTESTS

100-Mile National Championship, New York State Fair, Syracuse...Sept. 12 First Annual 400-Mile International Sweepstakes, Roosevelt Raceways, L. I.Oct. 12



A series of bulletins published by the Worthington Pump and Machinery Co. has been received. Company products include gasoline and Diesel engines, a full line of air compressors, and pumps for every need and purpose.

A new stock list—No. 55A—of standard and special washers has been issued by the Wrought Washer Mfg. Co., Milwaukee, manufacturers of washers, expansion plugs, and stampings. This new publication lists thousands of washer specifications in various materials including steel, brass, copper, aluminum and fibre.*

ous materials including steel, brass, copper, aluminum and fibre.*

Containing even more statistical information than previous volumes, the 1936 edition of the Operators' Handbook has just been published by the B. F. Goodrich Co., Akron. The handbook is full of data on tires and tire performances of interest to owners and operators of trucks, buses and tractors. Listing every ordinary type of tire and tube made by Goodrich for truck, bus or tractor service, specifications on each are given as well as a description of the service for which each type is suited.*

The Niagara Machine and Tool Works, Buffalo, N. Y., has issued a new bulletin covering its No. 101 Power Press.*

Clark Lift-Jack Units and platform quipment are described in a bulletin issued by the All Steel Welded Truck Corp., Rockford, Ill.*

The Bristol Co. announces Bulletin No. 457

ford, Ill.*
The Bristol Co. announces Bulletin No. 457
which describes in some detail the new
Pyrotrol recently announced. In this bulletin there is a considerable amount of information included regarding the application of the new Factory-Mutual-Approved
instrument which is offered as a safety
device for use on gas-fired industrial ovens.
—safety against pilot light failure.*

* Available through AUTOMOTIVE INDUS-

Just Among urselves

Living Costs Rise for Detroit

DISCUSSION with observers in Detroit of the long-term prospects of labor relations in the automobile industry usually comes down to a single fundamental consideration: that the situation six months or a year from now will be a race between the rising cost of living in Detroit and the efforts of the automobile industry to compensate for it by wage increases, bonuses, etc.

It is an unenviable fact that the cost of living in Detroit is increasing at a faster rate than in any other large city in the United States. According to the Bureau of Labor Statistics, in the period from June, 1933, to April 15, 1936, the cost of all goods purchased by wage earners and lower-salaried employees had risen 17.3 per cent in Detroit, while the average increase in these items for 32 large cities was 8.3 per cent. An increase for the period of 11.2 per cent in Portland, Ore., was the closest to Detroit's high figure.

The April 15 cost-of-living index in Detroit, standing at 77 on the basis of the 1923-1925 average equaling 100, is considerably below the index for many other large cities (Washington is the highest, with 85).

But it seems to be human nature to regard what is happening now as being much more important than what has taken place in the past. Therefore the fact that the cost of living in Detroit has risen 3.7 per cent in the past year and that this figure exceeds that for any other large city, may be expected to carry more weight in the minds of workers than the fact that the present index is below that for other cities.

In a comparable period (April, 1935-1936) payrolls of the automobile industry have increased 3.9 per cent, average weekly earnings of workers 9.3 per cent and average hourly earnings 6.6 per cent.

In theory, then, the latter figure should liquidate for workers in the automobile industry the disadvantages of an increased cost of living.

In April, the average weekly earnings of automobile workers were \$31.31, which outstrips those in any other industry in the country except insurance and public utilities.

The automobile unions are familiar with these figures and apparently have no fault to find with them, so they turn to another grievance; the profit rate of the automobile industry has risen far faster than the increases in the wages of workers.

Even the most violent of union leaders do not yet pretend to know what would be an equitable share of the profits for workers, and until some prophet comes from the wilderness, the answer will probably be a matter of compromise. But the necessity of finding some kind of an answer is being faced squarely by realists among the executives in automobile plants.

As we have pointed out in an earlier issue, the Federal tax on undistributed profits of corporations may result in further bonus distributions to workers. Other distributions will be made, we believe, in an honest attempt to see that workers benefit from the prosperity of our industry.

British Cars Wait on Mars

THE rearmament program of the British government is taking steel and skilled labor

from British manufacturers of motor vehicles, accessories, and service equipment. The price of steel has gone up to a point where it may be necessary to raise the price of British-made cars. About the only good that British dealers can find in the situation is that a possible shortage of new cars may enable them to clean up stocks of used cars.

So it is possible that American cars may find the British market more receptive in the next few months.

Butane Found To Be Economical

A LETTER from G. L. Holzapfel, whose name is associated with the development of Butane carburetion on the Pacific coast, brings up to date a letter from him which we published on page 904 of our issue of June 27.

Mr. Holzapfel's company has been conducting tests on 1936 model trucks (under the supervision of the Standard Oil Co. of California). In one case it was found that the utilization of heat units was 30 per cent better when Butane replaced gasoline in a particular truck. Miles-per-gallon figures are much better on the average when Butane is used, he claims.

Pierce-Arrow Making Trailers

PIERCE-ARROW announced this week a new tourist trailer, to be manufactured by a separate division of the company. The company emphasizes the fact that it does not intend to abandon the passenger-car field.

A couple of months ago we threw a cap over a windmill by suggesting that trailers might be a fertile field for passenger-car manufacturers. Congratulations to Pierce-Arrow for a pioneering venture, and we hope we were right about the possibilities involved.—H. H.

1900 Marketed Production 1900 1935

1930-1,943,400,000,000

1931-1,686,400,000,000

1932-1,555,900,000,000

1933-1,555,474,000,000

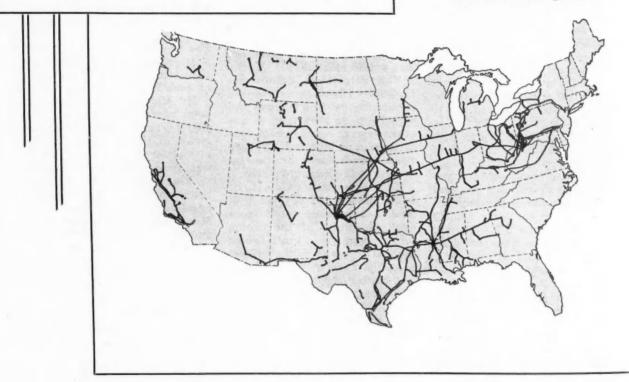
1934-1,770,700,000,000

1935-1,947,700,000,000

The marketed production of natural gas has grown tremendously in the years from 1917. Final figures for 1936 will probably show an increase over the 1930 peak.

The Wide | Prompts

A network of natural-gas pipelines makes "power through pipes" available over wide areas of the United States. The map s h o w s principal distribution lines, each of which serves many local distribution points.



By Perry Paul

UPPLIED through a network totaling more than 150,000 miles of field, main and distribution lines, natural gas is now available in all but ten states of the union, and new lines are being laid each year. This wide distribution has led to a growing interest in the use of this fuel for stationary engines, and engineers are at work exploring the possibility of using natural gas in trucks and tractors.

Gas engines as prime movers are used in ice plants, cotton gins, cotton oil mills, creameries, cheese plants, flour mills, produce plants, paper mills, packing plants, office buildings and municiple light plants. In many rural districts the farmers are using gas for pumping water, for irrigation, and for operating electric light plants.

Broadly speaking there are five categories into which the natural gas engines of today may be divided:

1. Converted automobile engines for stationary use.

3. High speed automotive type stationary engines.

3. Slow speed multi-cylinder vertical engines.

4. Two and four cycle, single and twin cylinder horizontal engines.

5. Heavy duty, multi-cylinder vertical engines.

The specifications of some typical engines, embraced in the last five divisions are listed in Table 1.

Distribution of Natural Gas Wider Use in Stationary Engines

As natural gas pipe lines have been extended to serve new communities, it has become desirable in some cases to convert the gasoline or Diesel engines already in service to burn the new fuel, and several manufacturers supply the parts necessary for this conversion. Such a change involves altering the compression ratio and changing the fuel system; also the ignition when a Diesel is involved.

Because of their low first cost and availability, a number of automobile engines have been converted to burn natural gas and are operating satisfactorily as stationary power plants. Since the modern engine employs a relatively high compression ratio, good performance can be secured without making any changes to the head or block.

In place of the standard carburetor and fuel pump, a gas carburetor and regulator such as the one illustrated (Ensign-Ford) is substituted. In many installations it is desirable to hold the speed within close limits, and for this

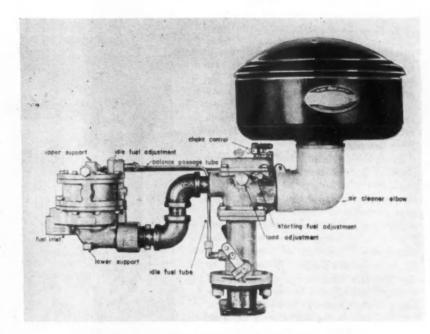


Fig. 1-Ensign gas carburetor and fuel regulator

Table 1 The specifications of some typical natural gas engines

		I wo Cycle 1;	pe		
Make or Name	No. Cyl.	Bore & Stroke	H.P.	R.P.M.	Туре
Cooper-Bessemer	2	11 x 15	145	400	Horizontal
	2	12½ x 16	160	300	Horizontal

Tono Carolo Tarno

		Four Cycle T	ype		
Make or Name	No. Cyl.	Bore & Stroke	H.P.	R.P.M.	Туре
Atlas	6	61/2 x 81/2	120	720	Vertical
Atlas		9 x 12	200	450	Vertical
Cooper-Bessemer	4	11½ x 14	200	400	Vertical
Ingersoll-Rand	4	18×24	600	257	Vertical
Ingersoll-Rand	8	18 x 24	1200	257	Vertical
Superior (Otto)	4	$4\frac{1}{2} \times 5\frac{3}{4}$	49	1400	Vertical
Superior (Otto)	6	41/2 x 53/4	74	1400	Vertical
Transit	6	6 x 9	100	720	Vertical
Transit	8	6 x 9	128	720	Vertical
Witte	1	10½ x 15	30	275	Horizontal

purpose a belt driven governor usually proves satisfactory. A cooling tank takes the place of the radiator and the water is circulated by the regular water pump on the engine.

Several interesting installations have been worked out where the operation is as automatic as when using an electric motor. If the engine is used for pumping water for example, a float in the tank cuts off the ignition at the high water mark, and when the tank has emptied to the danger point the ignition is again turned on and an automatic starting device cranks the engine. Except for occasional lubrication no attention is required from the operator.

Natural gas is composed chiefly of hydrocarbons of the paraffin series, the individual constituents varying within rather wide limits in samples taken from different sections of the country, as shown by Table 2.

Carbon dioxide and nitrogen are usually present in varying amounts.

In general the heat value of this fuel lies between 900 and 1200 B.t.u. per cubic foot, depending on its composition. Natural gas as a fuel for internal

Table 2 Constituents of Natural Gas from Different Sections of the Country

	1	2	3	4
Methane	96.19	89.80	85.61	81.28
Ethane		5.00	9.14	8.58
Propane		2.80	4.00	4.75
Butane	0.13	0.80	1.25	2.79
Pentane and Heavier	0.38	1.60	0.00	2.60

the weight of the air float brings it down to the shoulder on the gas tube, automatically shutting off the gas. A butterfly throttle valve controls the engine speed.

A metering device of totally different design, shown in cross section, employs a single plug type gas valve and two balanced air valves interconnected and operated together by the governor in such a way that a uniform mixture is maintained from no load to full load. An adjustable fulcrum is provided on the top lever to give any desired airgas ratio from 9:1 to 21:1, and once

combustion engines is quite different in its characteristics from a wet fuel such as gasoline. There are none of the problems of crankcase dilution, manifold heating or mixture distribution, and since its octane number (anti-knock rating) is high, there is little difficulty from detonation.

Since the gas is supplied through pipe lines at a relatively high pressure, a regulator is necessary to reduce this to the requirements of the particular engine in question. Some makers specify a pressure at the mixing valve of from 8 to 15 in. of water while others advise atmospheric pressure or even 2 to 3 in. below atmospheric. In addition to the pressure regulator a gas filter and a surge tank should be installed in the line to insure a steady flow of clean gas.

To secure economical operation with any type of internal combustion engine it is necessary to accurately meter the fuel in proportion to the air to secure good combustion. On the gasoline engine a carburetor is provided which maintains a correct air-fuel ratio throughout the power range, and which automatically shuts off the fuel, by means of a float and needle valve, the instant the engine stops.

The heart of the natural gas engine is the gas mixing valve, and many interesting devices have been developed which provide easy starting and smooth, economical operation under all conditions. Mention has been made of the necessitates an adjustment for making manifold at (10), the air enters at (11)

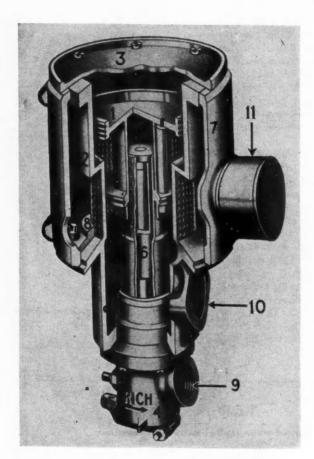
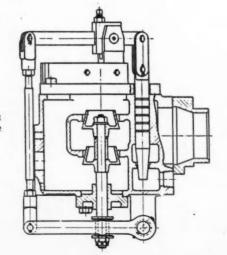
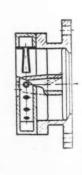


Fig. 2--Special design of a gas carburetor

range in the heat value of the gas in different parts of the country, and this the mixture richer or leaner according to the B.t.u. content. In the carburetor illustrated (Superior-Otto) the mixture adjustment is shown at (5). This mixing valve is connected to the intake and the gas connection from the regulator is at (9). In operation the air float (1) automatically rises and falls according to the speed and load of the engine, and as this float moves up and down it opens and closes both the gas and air ports, maintaining a uniform mixture ratio. When the engine stops





3 — Transit regulating valve and fuel mixer

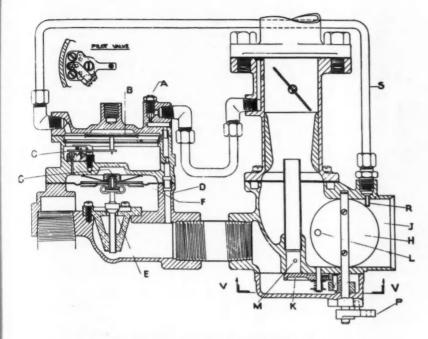


Fig. 4—Gas carburetor of more conventional type

this adjustment is set to give the best economy it need not be changed. In addition to this regulating valve a fuel mixer is provided which resembles a wagon wheel with the hub removed, the spokes being brass tubes with one end closed, the other end opening into the hollow rim through which the gas is fed. When the engine is running the air passes up between the spokes, while the gas escapes through saw slots cut axially in the spokes, resulting in a thorough mixing of the fuel and air.

A gas regulator and carburetor of more conventional appearance are shown in Fig. 4. Gas enters at V, filling the chamber below the diaphragm F and escaping through the restricted passage G to the upper side of F. As soon as the engine is turned over the suction communicated through passage D, pulls down the diaphragm B, opening pilot valve C and causing a partial vacuum above F. Due to the unequal pressure, diaphragm F rises, opening the main fuel supply valve E and admitting gas to the carburetor, where it enters the air stream through the main fuel passage K which is adjustable. For idling, gas is fed above the throttle and is controlled by the adjusting needle A.

On one of the leading two-cycle engines an interesting device known as a gas economizer has been worked out to insure a full charge of gas without the possibility of any being lost through the exhaust ports. In its operation the economizer valve injects a charge of fuel under approximately 15 lbs. pressure, producing a certain amount of supercharging. The gas is injected just

as the piston starts on the compression stroke, the quantity being controlled by the lift of the injection valve, which in turn is controlled by the governor. If gas is not available at 15 lbs. pressure, an auxiliary compressor is provided.

It has been estimated that nearly 75 per cent of the engines operating on natural gas today are of the single or twin cyinder, horizontal type, either two or four cycle. Many of these engines have an interesting main bearing design, using tapered roller bearings in place of the conventional babbitt type. The cones are pressed on the shaft directly against the shoulder adjacent to the crank, and the cups are pressed into

the caps, adjustment being accomplished by means of shims. The splash from the crankcase provides lubrication.

Because of the wide range in prices in different sections of the country, it is impossible to establish any definite relationship between the cost of operating on fuel oil, gasoline or natural gas. Also because of variations in engine design, it is difficult to establish fuel economies that will apply to all installations. The accompanying chart, however, gives average values based on actual tests, and from these figures an approximate cost can be arrived at, once the local price of the fuel being used is known. For example:

Horsepower required-full load	50
Daily operation-hours	10
Gasoline per gallon	10c
Fuel oil per gallon	5c
Natural gas per 1000 cu. ft	

From the chart it will be seen that at full output an engine running on gasoline consumes .108 gal. per horsepower hour, and since the engine is required to deliver 50 hp. for 10 hours this would give:

 $50 \times .108 \times 10 = 54$ gal. per day

gal. per horsepower hour.

54 x 10c = \$5.40 per day for gasoline When a Diesel engine is used the chart shows the consumption to be .065

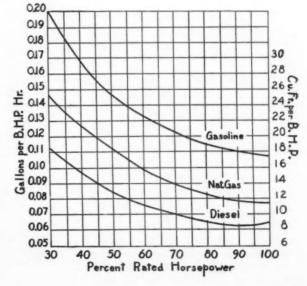
 $50 \times .065 \times 10 = 32.4$ gal. per day $32.4 \times 5c = 1.62 per day for fuel oil

Using natural gas, the chart indicates a consumption of 11.5 cu. ft. per horsepower hour.

 $50 \times 11.5 \times 10 = 5750$ cu. ft. per day $5750 \times .03c = 1.72 per day for natural

Fuel cost is only one item in the total operating cost of any power plant, and so from these figures it is impossible to draw any general conclusions. Unquestionably there is a field of applica-





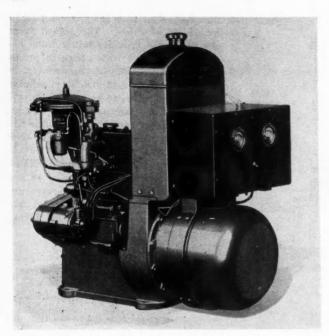


Fig. 6 — Kohler lighting plant

tion for each type of engine installation. With the natural gas engine there is no expense for fuel transportation or storage, and this is frequently an important consideration.

With the laying of new pipe lines, natural gas is being used in increasing quantities on farms not serviced by electricity, and engine driven lighting plants have been developed to operate on this fuel. Different models are available, but the type which starts whenever a light or appliance is turned on and continues to operate until all appliances are turned off is very widely used. Natural gas is well suited to this service as a supply of fuel is available at all times without attention from the operator, and no difficulty is experienced in starting the plant even in severe The engine illustrated weather. (Kohler) has a compression ratio of 4.8 and can be adjusted for economical operation on gas of any B.t.u. content.

On Canadaway Creek, Fredonia, New York there is a stone monument with a tablet bearing the following inscription:

"THE SITE OF THE FIRST GAS WELL IN THE UNITED STATES. LIGHTED IN HONOR OF GENERAL LAFAYETTE'S VISIT JUNE 4, 1825."

Little progress is recorded from this date until the year 1872, when the Newton gas well was sunk in Crawford County, Pennsylvania, and the first "long" iron pipe line was run to Titusville, five and a half miles away.

It is indeed a far cry from this twoinch line five and a half miles long to the 22, 24 and 26-in. lines of today. Line pressures too have increased year by year until at the present time the gas is raised to 300, 600, 800 and even

1000 lb. Natural gas as it issues from the ground is always under pressure, but there is a drop in the pipe lines, and with the consumer sometimes a thousand miles from the well it has been necessary to locate compressor stations along the way, usually at intervals of 50 to 100 miles.

Many engineering problems have been mastered in laying down this

vast network which serves 5248 communities in 38 states. Since 1900 the population served with natural gas has increased approximately 1000 per cent. It has been said that: "Natural gas is the least appreciated, consequently the most abused of the mineral resources in popular use." (1) For many years it was allowed to blow freely into the air, little effort being made to conserve it.

We know that at least 1000 years ago natural gas was known to the Chinese who transmitted it through bamboo pipes. What of the future? How much longer will nature supply us so freely with this fuel? We can only conjecture, but we do find encouragement in this report of the Bureau of Mines: "Although various estimates have been made of known gas reserves and on these bases computations have suggested the possible duration of the known supplies at present rates of consumption, there is a definite feeling by those who have studied the problem seriously that there are undeveloped and undiscovered sources of natural gas to supply new and extended markets. When general business conditions warrant, new lines probably will bring additional gas to waiting markets where, as in the past, it will take its place as a competitive fuel." (2)

(1) C. G. Gilbert—U. S. National Museum. Minerals Year Book, 1935. (2) Bureau of Mines, U. S. Dept. Interior.

Rapid Grinding Technique for Carbide Tools

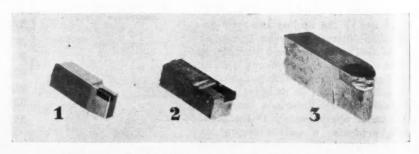
CARBOLOY COMPANY, INC., Detroit, Michigan, recently completed a series of educational demonstrations in various cities showing an improved technique for the grinding of carbide tools.

Examples of the remarkably short periods now required to grind various types of carbide tools are shown in the accompanying illustrations. The tool (size $\frac{5}{6}$ in. x $1\frac{1}{4}$ in.), shown in Fig. 1, is typical of one dulled through ordi-

nary use. It requires regrinding on the front and side clearances only. The average time required to completely resharpen a tool of this type, following the latest procedure, is between two and three minutes. The average time using previous methods would be from 20 to 40 minutes.

A "milled and brazed" carbide tool is shown in Fig. 2. "Milled and brazed" carbide tools are ones released

(Turn to page 196, please)



Figures 1-2-3-Three steps in grinding carbide tools

The Horizons of Business

-By Joseph Stagg Lawrence

The Issue

HE diminishing defenders of the administration severely assailed the Landon acceptance speech on the ground that its merits consisted exclusively of principles first discovered by the New Deal. It offered nothing new.

These loyal critics quite missed the point. For more than three years the country has fed upon a strong diet of sudden and radical changes. Scarcely a field of government and enterprise has not experienced reform. The correction of abuses, real or fanciful, paused momentarily from time to time only to permit the master reformer to doff the habiliments of the crusader and don those of the great magician pulling rubber dollars, shelter belts, harnessed tides, prodigious canals, mighty dams, reciprocal treaties and what-have-you from a capacious silk hat. To a land ill with the disease of depression and discouraged with the futility of patience these stunts were diverting and offered some plausible hope for the relief of the patient.

The Mood for Heroes

The administration came into office convinced that something had to be done and proceeded to do it even though it meant building bridges to nowhere and ladders to the moon. From time to time the mellifluous voice of the great alchemist took "My friends" into his confidence, explained what he was doing, where he was going, and precisely how the patient would benefit. The nation was in the mood for heroes. It was sufficiently desperate to admit that something must be done. It was not disposed to question the impulsiveness of measures, to note the malice of the draftsmen who had never made first base in real life or to realize that the cure might be worse than the disease. Suffering had made the land gullible and an easy prey to the snake-oil vendors in the capital.

Recovery

That period is happily over. The country is rapidly approaching a condition which may be described as normal, an alleged twelve million work-

less workers to the seeming contrary notwithstanding. Automobile production is currently proceeding at a rate more than 50 per cent above the average production of the period 1926-1930. Steel production during the first six months of the year was exceeded during only three years of the post war decade from 1921-1930. The weekly rates of operation in terms of capacity are deceptive because capacity today is about twelve per cent greater than in 1929. A rate of 72 per cent today is equivalent to 81 per cent of the 1929 capacity. The production of agricultural implements during the first half of the year indicates a year's output greater than any previous year in the history of the industry excepting only 1929.

Unemployment

Madame Perkins has estimated that 43 to 44 million men and women are at work today not counting those on PWA jobs. How near normal is this? The U. S. Department of Commerce has made an excellent study of the national income for the period 1929-1932. It shows the origin of income produced and the number of workers engaged in its production. The sum of these workers in 1929 is approximately 44 million. It is true that boys and girls have come of age in the interval and that older workers have retired or died. The difference cannot possibly aggregate the twelve millions who regularly provoke Mr. William Green to tears. There is something very, very rotten in the state of unemployment, a conviction strongly supported by the refusal of the government to count the unemployed and determine which are bona fide workers without jobs and which are bums cashing their prospective support of the New Deal in the fall. The stock market has made phenomenal recovery and and agriculture is definitely on the way out in spite of drought, floods and Secretary Wallace.

A New Mood

The country no longer needs a man in the White House who is a combination of Houdini, John Law, Bing Crosby, Karl Marx and Mae West. It

no longer wants a rash mariner willing to set his compass for the mythical Utopia and spend the substance of future generations to secure re-election. If Landon in his acceptance speech said nothing new that is precisely what an increasing majority of the country craves nothing else but. It is weary of sensational performances, of state-men who woo the headlines, of public servants more concerned with impressions than accomplishments. A new mood is upon the country. It asks not for an actor emitting scintillating rhetoric obviously manufactured by literary mercenaries but a modest, plain speaking pilot who is more concerned with a safe course for his ship than the plaudits of the steerage.

A Strong Recommendation

The charge that Landon offers nothing new is the strongest possible recommendation for the Republican candidate. Landon seems to personify the new mood. We hope that he and his advisers will not make the mistake of trying to match the geegaws of the braintrusters with more brilliant schemes bearing the Republican label. That would make better copy for the editors who deplored the content of the acceptance speech. On the other hand it would profoundly disappoint a reform weary land and perhaps give Messrs. Hopkins, Tugwell, Ickes, Wallace, et al. another four years of grandeur.

Which Personifies the National Mood

This we conceive to be the real issue of the campaign. Business recovery has revived for a majority of our citizens their conservative instincts. things going well they do not wish to he used as guinea pigs by futile theorists guided by blue prints of perfection. Speeches and platforms will scarcely affect the judgment of this majority. The character of the President is definitely established. The spots are plainly visible and no swing to the right or honeyed words can change them. Mr. Landon seems equally clearly delineated. He is no man on horseback, no Draconian law giver, no Savonarola. On the scale of political personality and

(Turn to page 200, please)

Simulated Leakage Gages

By Earl A. Keeler

URING recent years many improvements in spark-plug performance have followed the rapid developments in design and engineering of internal-combustion engines. Considerable has been written concerning the thermal or heat-range aspects of performance, as related to design and materials, but comparatively little has appeared in regard to the essential function of sparking ability under the adverse conditions that engine developments have imposed. With the thought of contributing to a wider understand-

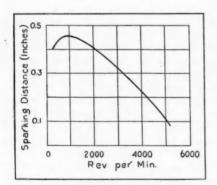


Fig. 1—Variation of sparking distance with engine speed due to varying saturation of core of spark coil.

ing of the electrical aspects of sparkplug problems and describing convenient means for the comparison of sparking ability, the following has been written.

The inherent time-magnetic lag of the usual ignition coil is responsible for the limitation of sparking voltage. Increased engine r.p.m. results in a decrease of sparking voltage, as shown by the graph of Fig. 1, which is based on the performance of a typical 6-cylinder ignition system. This serious decrease in voltage available for spark production is due to the fact that at the higher engine speeds the time during which the interrupter points remain closed is insufficient to permit the

primary current to attain its full value. Fig. 2 is typical of the relation between engine r.p.m. and the percentage of maximum primary current at the time of break.

To further complicate ignition problems, the decrease in sparking voltage has been accompanied by other developments that establish a need for higher sparking voltages. The several factors involved are:

- (1) Increased engine compression ratios and greater resistance to sparking.
- (2) The trend toward longer spark gaps to overcome "stratification" of the gas mixture.
- (3) Leakage through conductive films deposited on the insulator tip.
- (4) Increased leakage because of the "hot" conduction through the insulator body of the smaller plug types.

It is apparent that until substantial improvements are made in ignition systems, the margin of sparking voltage available over that actually required is so slight that the sparking ability of plugs becomes a matter of great importance. Improved electrode alloys have been developed to increase sparking ability. One of these, involving the addition of barium to increase electron emissivity and lessen sparking voltage, has been well covered in a technical paper.1 Because of these developments and the highly involved technique of actual measurement of sparking voltage, the work described in the following paragraphs was carried out to establish a convenient and reliable method for comparing the sparking abilities of various plugs and electrode alloys.

The essentials of a satisfactory basis

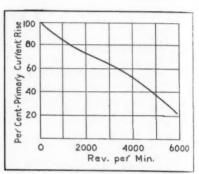


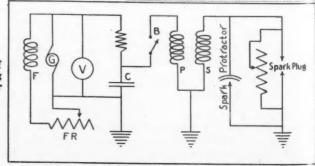
Fig. 2—Variation of maximum primary current with engine speed

for comparison were based on the following requirements:

- (1) Actual operation in an engine under conditions of compression ratio, fuel, and spark-plug gap equivalent to those normally used in service.
- (2) Accurate control of gas mixture, r.p.m., spark advance, operating temperature, etc.
- (3) An ignition system, controllable in regard to sparking ability, and possessing a minimum of possible errors due to variations in breaker contacts, gap. etc.

The standardized CFR Engine² was selected as best meeting these requirements. Fig. 3 shows the circuit diagram of the ignition system. It will be noted that the primary current is derived from the discharge of a condensity

Fig. 3—Diagram of circuit for testing spark plugs for sparking ability



¹ The Development of an Electron-Emitting Alloy-Electrochemical Society — April 24, 1931.

⁽²⁾ Made available for this work through the courtesy of the Waukesha Motor Co., Waukesha, Wis.

Ability of Spark Plugs

ser charged by a direct-current generator operating at a normal voltage of 110 volts. The charging voltage, and consequently the primary discharge, are accurately measured and controlled by the use of a voltmeter and a rheostat in the generator field. The minimum voltmeter indication consistent with steady firing was taken as the criterion of sparking ability for the plug under test. Repetition of experimental tests over a period of months showed consistently uniform results.

The important part played by electrical leakage through conductive depositions makes it desirable to take account of it in all comparisons of

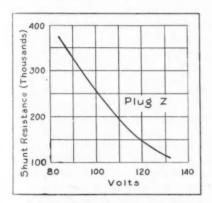
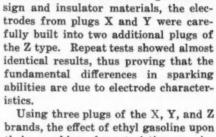


Fig. 4—Variation of primary voltage required for steady firing with shunt resistance (Plug Z)

sparking ability. Accordingly, the practive of providing an artificial leakage path across the plug was adopted. This artificial leakage path consisted of a suitable shunt resistor of 200,000 ohms, which approximates the maximum leakage through a plug under ordinary operating conditions consistent with steady firing. Fig. 4 shows the effect of the shunt resistance on the primary voltage required for steady firing. Ultimately, a fixed ignition veltage with variation of shunt resistance to the point of misfiring, was taken as a measure of a plug's ability to produce satisfactory ignition under conditions representative of the demands upon the spark plug. It is evident that the plug possessing the greatest sparking ability will permit Plugs are operated on CFR engine with resistance shunted across their terminals. Those sparking with least resistance have highest ability

the greatest decrease in shunt resistance before misfiring begins. Consequently, the conductance or the reciprocal of the resistance value becomes the measure of permissible shunt leakage and a reasonably accurate basis for comparisons of sparking ability.

Some interesting results were secured in the comparison of three well-known spark plugs of the conventional doubleelectrode type with a plug of the surface-sparking type using a long gap (0.075 in.) partly traversing the tip of the insulator. The results of these tests are shown in the graphs of Fig. 5. It will be observed that in the conventional types, X and Y showed superior sparking abilities in comparison with that of Z. The less conventional type S, showed even greater sparking ability, presumably because of its surface sparking characteristics. X, Y, and Z were selected as typical of those involving three separately manufactured insulators and electrode materials. They were also selected to secure approximately equal operating temperatures at the electrode. In further comparison of these three types,



te eliminate variables arising from de-

Using three plugs of the X, Y, and Z brands, the effect of ethyl gasoline upon their sparking characteristics was investigated. It was noted that a substantial improvement in sparking ability occurred in the case of Z, but little or no change could be noted in the performance of X and Y. The data secured follow:

X Plugs—(150,000—Regular Gasoline (150,000—Ethyl Gasoline

Y Plugs—(150,000—Regular Gasoline (150,000—Ethyl Gasoline

Z Plugs—(200,000 ohms—Regular Gasoline (150,000 ohms—Ethyl Gasoline

As a check on these results, some of the regular fuel was brought up to the anti-knock rating of the ethyl fuel by the addition of tetraethyl lead. No discrepancies were found.

In an effort to determine the cause of the interesting effect of ethyl gasoline on the sparking ability of plugs of the Z type, and its persistence, a start was made with regular gasoline, followed by a short run with ethyl gasoline, and finally by a shift back to the regular fuel. The results of this experiment are shown in the graph of Fig. 6. It seems evident that the cause of the improved sparking performance is due to a deposition on the electrodes and not the altered condition of the gases immediately surrounding the elec-

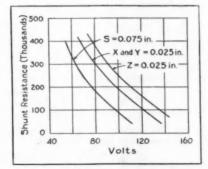
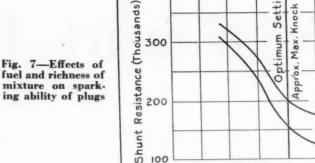


Fig. 5—Variation of primary voltage required for steady firing with shunt resistance with various plugs and sparkgap lengths

trodes. Further comparisons of sparking behavior of the Z plug were made by varying the carburetor adjustment when using both regular and ethyl fuels. The results are embodied in the graphs of Fig. 7. These graphs will be recognized as typical of the changes in sparking voltages occurring at the transition from lean to rich mixtures, and as emphasizing the need for careful standardization in fuel and mixture when making sparking voltage comparisons.

Further comparisons were made of the sparking ability of plugs in various conditions after actual service in engines. These used plugs were compared with new plugs in an effort to show the depreciation in sparking ability produced by service. The condition of the electrodes and the effect of leakage through the heated deposits on the firing tips were regarded as the essential points involved. Sand-blast cleaning of the tips of used plugs was resorted to, in an effort to separate surface effects from those of structural



100

-75

50

25

0

400

effect of deposition upon sparking ability is greater than that of electrode deterioration due to spark erosion. Spark plug gaps were all adjusted to 0.025 in, before making the tests on these used plugs.

A few comments on the precautions

spark gap, heat-range position, and fuel and engine conditions. The last factor, engine conditions, can be readily kept constant in the fuel-rating engine, as a similar requirement must be met when making fuel comparisons. A typical tabulation of essential data follows:

25 Carburetor Setting (Degrees)

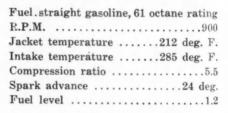
Plug Z

Straight Gas

Ethyl Gas

50

75 +



The carburetor used was of the standard CFR research type, with float-level adjustment and fixed throttle.

Fig. 8 illustrates the importance of temperature control for the gases in the inlet manifold. Here electric heating of the intake gases, which is standard in the CFR engine test of fuels for knock rating, is of great value. It is, of course, highly important that a suitable fuel be selected for all comparisons of sparking ability. This is emphasized by the differences in the results secured with straight gasoline and with ethyl fuel. The limited scope of this investigation does not provide a basis for recommendations along this line at the present time.

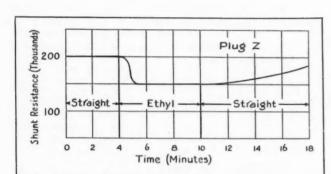


Fig. 6—Effect of ethyl gasoline on sparking ability of spark plugs

in service. The results of this investigation are tabulated below.

(1) Insulator tip glaze blistered, electrodes slightly worn, brownish, white deposit on insulator tip. 225,000

(2) Tip glaze fused, apparently because of lowered melting point due to lead deposit 300,000

(3) Brownish red deposit slightly blistered tip glaze, electrodes show very little deterioration. 275,000 (4) Condition similar to (3)

but cleaned by a light sand blasting 200,000

(5) Badly worn electrodes, slight blistering and deposition 175,000

Consideration of the values of shunt resistance found for the used plugs described above confirms the conclusions previously reached that the conductive

changes in the insulator and electrode to be observed in making comparisons with respect to sparking ability may be apropos. Where the comparison is one between different electrode allcys, extreme care must be taken to see that the alloys are embodied in exactly similar plugs. Where complete

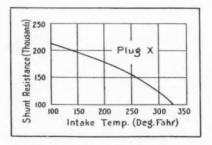


Fig. 8-Effect of intake temperature on sparking ability
(Plug X)

spark-plug structures are to be compared, the variations and consequent sources of error are limited to the

1200 Hp. Zeppelin Engines

HE 16-cylinder Daimler-Benz engines with which the new Zeppelin Hindenburg is equipped develop a maximum of 1200 hp. each, the cruising output being 800-900 hp. The new engine is based on the 12-cylinder 750-hp. Diesel aircraft engine developed by Daimler-Benz some years ago. As a considerably greater output was required, which with a 12cylinder engine could have been obtained only by supercharging, and it

(Turn to page 200, please)

UTOMOTIVE ABSTRACTS

Diesel vs. Steam Costs in Railroad Operation

N a paper on "The Diesel—in the Zephyr and other Railway Applications", F. G. Gurley, Assistant to the Executive Vice President of the Burlington Lines, gave some comparisons of the cost of steam and Diesel-electric traction in railroad work. The Burlington uses three 450-hp. Diesel-electric (four-cycle) switching locomotives. They are assigned to service 24 hours per day, six days per week, and 16 hours on the seventh day. Thus there is an allowance of eight hours per week for maintenance.

The cost per switch-engine hour, exclusive of the wages of the switchmen, as compared with the steam locomotive

replaced, is as follows:

	Steam	450-hp. Diesel
Fuel	\$1.438	0.229
Repairs-Running	0.696	0.36
Repairs—General	0.180	
Wages, enginemen	1.63	0.92 (no fireman)
Lubricating oil	0.015	0.078
Water	0.11	
Engine house expense	0.10	0.054
Depreciation	0.046	0.363
	\$4.215	\$2.004

In the above, the depreciation was figured at the rate of 4 per cent for the steam engine and 8 per cent for the Diesel. The depreciation charge is almost 32 cents per hour more for the Diesel, yet the hourly saving by its use is \$2.21.

The speaker said he understood the Burlington used more gas-electric cars than any other American railroad, its operation of such cars amounting to three million car-miles per year. Operating costs per mile, exclusive of crew and carrying charges, averaged as follows during a five-year period:

Maintenance, both running and general, including gasoline engine, electrical equipment, truck and car body, 5.58

Fuel and lubricating oil, 5.23 cents;

Total, 10.81 cents.

The author also gave some cost figures of high-speed streamlined trains of the Zephyr type. The two trains assigned to daily round trips between Chicago and the Twin Cities operate at an over-all speed between Chicago and St. Paul terminals of 66.3 m.p.h. and make 2.9 train miles per gallon of fuel oil, hauling a total of three units. This is the fastest schedule in the United States on runs in excess of 100 miles. The other two pull four units each on a somewhat slower schedule; one makes 2.4 train-miles per gallon, the other 1.9. The present purchase price of fuel is 3.49 cents per gallon.

The cost per train-mile for locomotive maintenance, fuel and lubricating oil from the time the four trains were placed in regular service to Feb. 1, 1936, was as follows:

	Cent
Locomotive maintenance, including Diesel trical equipment, power truck (one) and	d other equip-
ment in engine compartment	2.65
Fuel oil	1.39
Lubricating oil	
Total	4.8

The Twin City trains did not replace any steam mileage, but in Missouri, where the reverse is true, the steam costs ran as follows:

Locomotive	ms	aiı	nt	ei	ns	9.1	ne	90		R	È 11	ın	m	i	n	O'							Cents 10.21
												n											
Fuel																	 	 			 		13.77
Lubricating	oi	il		. ,													٠				•		negligible
Total																							28 98

The Burlington plans to inaugurate 16-hour passenger service between Chicago and Denver, a distance of 1034 miles, with two 10-car trains. It is also planned to replace the two 3-car trains between Chicago and the Twin Cities with two 6-car trains, because the present ones are not large enough. The equipment released will be transferred to places where it is felt that the improved and expedited service made possible by it will build up patronage in the same manner as it did between Chicago and the Twin Cities.

These four large trains will be pulled by Diesel-electric locomotives. It is planned to purchase four 1800-hp. and two 1200-hp. units. An 1800-hp. and a 1200-hp. unit will be coupled together on each Denver train, thus furnishing 3000 hp., and the remaining 1800-hp. units will be used on the Twin-City trains.

The cylinders of all of the Diesel engines in road service will be of the same size, as will all traction motors.

A spare truck will be kept at Chicago which will fit under the 1800-hp. as well as under the 1200-hp. units.

Diesel-Engine Compression-Ignition

HE reasons why nozzles of Diesel engines carbonize in service is explained in one of a series of two articles entitled "Some Compression-Ignition Engine Problems" contributed to the columns of The Engineer by George Amery. Nozzles used with a jerk-pump system, he explains, carbonize at the end of the injection period. Owing to the reduced pressure at the nozzle end and the reduced clearance between valve and seat, a dribble is produced. This dribble occurs at a moment when both the pressure and the temperature in the cylinder are lowered, when there is a scarcity in the supply of oxygen and an increase in the supply of inert gases and vapors. A slow cracking or distillation process takes place on the nozzle walls, the lighter constituents of the fuel are whirled away, in the absence of sufficient heat (a large proportion of the local heat being carried away by the metal surrounding the nozzle) to carry the combustion process to completion, a certain molecular attraction between the steel and carbon is satisfied, and, therefore, a carbon deposit appears. Combustion generally takes place away from the nozzle-owing to the spray velocity-and so the next combustion cycle cannot clear away the carbon deposit. Were the last stages of the injection period carried out at a pressure equal to or higher than the initial pressure, fuel nozzles would not carbonize so easily.-The Engineer.

Shorter Double-Duro Hardening Process

ECENTLY the scope of what is known as the Shorter process for surface hardening has been extended and made applicable to pins and journals of crankshafts, rollers, and other parts of cylindrical form which are subjected to frictional wear. On the Continent the new process is known as

the Doppel-Duro process, and it is stated that in Germany some 250,000 cranks have been hardened by this method, which consists in heating the steel by an oxy-acetylene blow pipe and rapidly cooling the heated surface, both heating

and cooling being mechanically controlled.

The unit to be hardened is mounted in a machine of the crankshaft-grinding type. Care is taken to ensure that a range of speeds can be obtained, since for each diameter to be hardened there is a critical speed of rotation and a critical time of heat application. The rate of heat application is made such that there is a limited accumulation of heat at the outer surface, sufficient to raise it slightly above the Ac₃ critical point. When this temperature is reached, the heated metal is rapidly quenched, as any delay in this operation causes heat dissipation into the core of the metal. The process produces a hard outer skin varying in depth and width according to requirements, but it has been found that a penetration of 5 per cent of the diameter of a cylindrical

piece is most effective. The transition from the very fine and hard martensitic skin to the tough sorbitic core is said

to be very gradual.

Most crankshaft steels, provided they are of the straighthardening type, lend themselves to treatment by the new process, and very successful results have been obtained with the steels falling within the range of analyses given in Table I above.—Engineering.

Anti-Detonation Quality of Fuels

NEW scale for the anti-detonating quality of fuels for carburetor engines has been developed by Max Serruys and was described by him in a recent issue of *Le Génie Civil*.

According to the author, the octane-number system is open to the objection that, even though it permits of ascertaining the limiting inlet-manifold pressure and the highest useful compression ratio for a given fuel and a particular engine, these factors alone do not determine the real combustion value or combustion quality of the fuel under test. It is obvious that the performance obtained with the fuel in actual use, that is, the brake horse power developed by the engine and the specific consumption shown by it, are dependent not only on the pressure in the inlet manifold and the compression ratio used, but also on certain characteristics of the fuel, such as its heat value, its chemical

combining ratio, its volatility, density, etc.

Starting with these theoretical considerations, the author developed the following new method of rating carburetor fuels, which yields what is known as the synthetic index of the fuel, a factor which is claimed to be representative of the performance which may be expected from the fuel. The method consists in comparing the brake horse powers obtained in one and the same engine with the fuel under test and a standard fuel. For reference fuel the author suggests a pure compound or a blend of pure compounds, such as octane and heptane. In each test the manifold pressure is so regulated that there is a light knock in the engine. Naturally, every precaution is taken to prevent the results from being affected by other factors which might influence the operation of the engine, such as changes in the temperature and humidity of the air, changes in the temperatures of the oil and water and in the ignition advance. The carburetor in all tests is adjusted so that the percentage of oxygen in the exhaust is constant. The ratio of the power outputs obtained with the fuel under test and the standard fuel, respectively, multiplied by 100, is the synthetic index

of the fuel under test. This method takes account of all of the characteristics of the fuel which may influence the practical performance of the engine.—Le Génie Civil, March 21.

Fuel Injection with Spark Ignition

HE subject of fuel injection in engines with spark ignition was discussed in a paper presented before the second section of the French Society of Automobile Engineers by M. Ziembinski. After reviewing the work done along this line in various European countries and in the U.S.A. (Hesselman, Pratt & Whitney, Wright), the author gave some information on similar developments in France.

Gabriel Voisin for his "automobile of the future" developed a seven-cylinder radial engine. Originally a single carburetor was provided, and when it was found impossible to obtain satisfactory results with this, it was replaced by a triple carburetor. However, great irregularities in the carburetion still persisted, and Voisin then tried a Bosch injection pump. The latter, however, seized and its period of injection also was too short for the purpose. then designed a pump of his own, of the barrel or round type, the plungers being operated by a swashplate. In order to prevent seizing of the plungers, he made them quite long and gave them considerable clearance, relatively. At the middle of the length of the plungers he introduced oil under moderate pressure, which assured lubrication of the plungers but did not allow it to mix with the fuel. The plungers were in continuous contact with the swashplate, with the result that each pump delivered fuel during onehalf a revolution of the plate, corresponding to a complete revolution of the crankshaft. As a result of this low velocity of injection and the large size of the orifice in the open-type nozzle, the fuel was merely deposited ahead of the inlet valve. When the inlet valve was lifted, the fuel was drawn into the cylinder with the air, and vaporization and mixture of the fuel with the air took place in the cylinder. Certain engineers who saw the engine on the test block assert that it ran as well at low speeds and when idling as when under full load.

An injection system for aircraft engines has been developed by M. Lauret, a carburetor expert. His method is quite similar to that of Pratt & Whitney in some respects. He places his injector on the inlet manifold, but closer to the inlet valve than it is on the Wasp, because he made his tests on an engine without supercharger. Hence there is no preheating of the air in his engine, and if the injector were as far from the inlet valve as in the Wasp ice might form in the manifold. As in this engine there was little overlap of valve periods, it was found advisable to begin injection in dead center under full load. The maximum duration of injection was 120 deg. For reduced charges the beginning of injection is retarded and injection always

ends at the same point of the cycle.

The injector used is of the closed type, with a flat valve having very little inertia. In order to transform the jet into a conical one directed toward the front, and to improve the atomization, he surrounded it with a small venturi. The pump is of the barrel or round type, the plungers being given a harmonic motion by a swashplate. Precautions were taken to assure efficient lubrication for the plungers and to prevent the oil from mixing with the fuel.

The chief difference between the Lauret and the American systems consists in the means employed for controlling the discharge and varying the richness of the mixture. While in the American Chandler pump the stroke is variable, in the Lauret pump it is constant. In the latter each pump barrel is provided with a suction valve and a delivery valve, the suction valve being actuated by a cam permitting of closing this valve with great retardation, during the delivery stroke of the plunger. By shifting the cam laterally, the moment of closing of the suction valve, which marks the beginning of injection, is varied. The later this valve is closed, the shorter will be the injection period. The



Production Lines

Body assembly line at Pontiac just before the installation of upholstery and trim

Take Gaff

We got an interesting slant, the other day, on the quality of the present-day crop of light trucks of the type represented by Ford, Dodge, Chevrolet, Reo, etc. A public utilities superintendent with a fleet of over 500 vehicles under his wing told us that his light trucks are good for 65,000 to 100,000 miles of hard work. The average is at least 65,000 miles and, of course, many of the trucks cover in excess of 100,000 miles before retirement. Preventive maintenance and regular inspection enable them to get more out of the truck than most people can get out of a passenger car fitted with the same units.

Good Welds

Oxy-Acetylene Tips for July has an article on welding that you should read without fail. It has to do with the need for setting up qualification tests for welders so as to acquire advance knowledge of the proficiency of the operator. Standard tests have been pretty well defined over a period of years and are available to anyone interested. The article reviews some of these. Read it by all means.

Concrete Molds

Production of large castings with the use of molds of concrete instead of sand is a constribution of the Chambersburg Engineering Co., which has attracted considerable attention. The method eliminates the use of sand and flasks and permits the use of simpler

patterns. Corners are cleanly defined and unexpectedly chilled surfaces are avoided. Blow holes are said to be things of the past because no gas-forming carbon is used as a binder. The concrete mold lends itself particularly well to the casting of Cecolloy—the synthetic nickel-moly iron alloys which were recently developed by this company.

Better Micros

A new bulletin describing the modern line of photo-micrographic equipment made by Bausch & Lomb is off the press. In addition to a description of cameras, microscopes, and accessories, the bulletin includes a brief technical discussion of the factors in photo-micography. It's a valuable contribution to your bookshelf and we shall be glad to get you a copy.

Front Grilles

There is talk that the big die-cast radiator grilles of last year may give way to a smaller but more distinctive form for 1937 cars. At least that seems to be the plan for a number of makes.

Strong Coupling

Now that the tourist-trailer business has assumed a prominent position in the industry's thinking, we might reiterate an idea proposed in this column some time ago. Briefly, we suggest the development of a standard trailer hitch consisting substantially of a husky forging or casting riveted to the tail end of the towing car. This bracket

could be installed at the factory or by the dealer but it should be a standardized part so that trailer attachment would become a conventionalized procedure. And it would add to the safety of the trailer rider as well as the highway user.

Cutting Oils

For some reason or other cutting oils have been treated as a sort of stepchild in the metal cutting world. Yet those who have been concerned with it realize that the cutting oil is as much a factor in production as is the cutting tool. The Independent Research Committee on Cutting Fluids which we helped to usher into the world has embarked on several projects calculated to produce a better understanding of the role of these materials. Simplification of materials, more rational testing procedure, and a better knowledge of efficient utilization—these are some of the committee's objectives. We should like to enlist the cooperation of more of the automotive industry's metallurgists. Let us know whether you would like to work with us.

Zinc Finish

An enamel finish that is said to adhere tenaciously to zinc and aluminum die castings has been announced by Maas & Waldstein. The company is now in position to supply a line of airdrying lacquer enamels which produce an elastic finish in one coat. These finishes are supplied in gloss and eggshell sheens, in white and in black, and 32 standard shades.—J. G.



Crankshaft and Connecting Rod Bearings

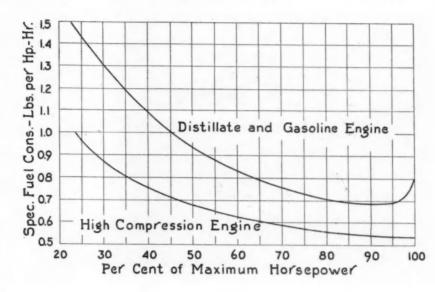
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Tractor Operated with High-Octane Fuel Develops 7.05 Drawbar hp.-hr. per Gallon

NE of the first tractors with an engine designed to be operated on high-octane gasoline, to be officially tested at the University of Nebraska is the M-M Twin City KTA (HC), for which test report No. 249 has been issued. This tractor has a four-cylinder engine of 41/4-in. bore and 5-in. stroke, designed to operate at 1150 r.p.m. It has 11/2-in. inlet and 1%-in. exhaust port diameters. The belt pulley is 14 in, in diameter and has a 7-in. face, and is geared to turn at 822 r.p.m. The engine carries an American Bosch magneto, a Schebler 1-in. carburetor, a centrifugal governor of the tractor manufacturer's own make, and a Donaldson air cleaner (ejector and oil-washed wire-screen filter).

The tractor is of the four-wheeled type with two propelling wheels driven by enclosed gearing. A hand-controlled twin-disk single-plate clutch is fitted and the transmission gives three forward speeds and reverse, advertised as equal to 2.25, 3.25, 4.25 and 1.9 m.p.h. respectively. The tractor is fitted optionally with steel or rubber-tired wheels. With steel-wheel equipment the rear wheels are 42 in. in diameter and have a 10-in. face. Spade-type lugs are provided, twenty per wheel, 4 in. high and 2 in. wide. With rubber-tire equipment the rear tires are 12.75 by 24 in. and the front tires 6.00 by 16.00 in. Rear tires are inflated to 16, front tires to 30 lb. per sq. in. To increase the traction, four weights are provided for each drive wheel, of an aggregate weight of 560 lb. The total weight of the tractor as tested, with operator, was 5225 lb. with steel-tire and 6230 lb. with rubber-tire equipment.

Fuel used in the tests was gasoline of 68-70 octane rating weighing 6.13 lb. per gallon. The engine was lubricated with S.A.E. 20 oil, of which a



total of 3.373 gallons was supplied to it. The oil was drained off at the end of the test, after 61 hrs. of operation, the amount being 1.451 gallons.

In the maximum-load test, the engine developed 41.60 hp. at 1150 r.p.m. and consumed 0.528 lb. of gasoline per b.hp.-hr. In the rated load test, it developed 37.22 hp. at 1151 r.p.m., with a specific fuel consumption of 0.545 lb. per b.hp.-hr. Tests were also made over practically the whole load range, down to 0.84 hp., and the corresponding specific consumptions determined. These values are plotted in Fig. 1, on a basis of per cent of maximum output, and for the sake of comparison a curve of specific consumption vs. per cent of maximum load representing the average results from three distillate and low-compression gasoline engine tractors of older type is also drawn in.

In the drawbar tests, the tractor developed a drawbar pull of 4888 lb. at 2.09 m.p.h. (27.18 hp.) in first gear;

3302 lb. at 3.41 m.p.h. (30.07 hp.) in second gear, and 2365 lb. at 4.56 m.p.h. (28.78 hp.) in third gear. In the tenhour rated-load fuel-economy test in second gear, the tractor developed 1 drawbar hp.-hr. on 0.795 lb. of fuel and 7.71 drawbar hp.-hrs. on one gallon. In the corresponding four-hour test in third gear, it developed 1 drawbar hp.-hr. on 0.869 lb. of gasoline and 7.05 drawbar hp.-hrs. on 1 gallon.

No repairs or adjustments were made during the tests. All of the engine test results given in the foregoing were determined from observed data, without allowances. The maximum-load tests were made with the carburetor set for maximum power. Other tests were made with an "operating setting" of the carburetor determined by the manufacturer. The highest permissible horsepower ratings for this tractor in accordance with standard tractor codes are 22.96 drawbar hp. and 36.95 belt hp.

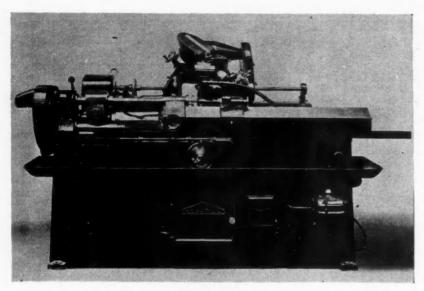
Gnome-Rhone 1400-Hp. Radial Aircraft Engine

WHAT is claimed to be the most gine, and in a way is a development of powerful aircraft engine of the radial type ever built recently passed its type tests at the Service Technique de l'Aeronautique Française. It is a Gnome-Rhone two-bank 18-cylinder en- object aimed at, viz., maximum power

the 14-cylinder of the same make, but it is pointed out that in the production of the 18-cylinder model many difficulties had to be overcome to achieve the for a given bulk and total weight. Crankcase, crankshaft and connecting rods are of the same general design as in the 14-cylinder, the crankcase being in three parts, with the central part

(Turn to page 195, please)

NEW DEVELOPMENTS Automotive Parts, Accessories and Production Tools



Newall automatic universal thread grinder

Universal Thread Grinder-Fast, Accurate, Complete

The Newall Automatic Universal Thread Grinder is designed to grind taps, gages, dies, bolts and all precision threaded work with accuracy and speed. The high-speed single-ribbed wheel, used for such work as thread gages, takes a series of light cuts which enables strains to be released gently and corrected as they occur. At the same time, the drawing of temper is eliminated. A patented diamond truing device, operated on the pantograph principle, is provided.

Thread is obtained by means of a lead screw and change wheels, so accurately mounted and adjusted that the pitch is controllable within one ten-thousandth of an inch. Any division for multithread or annular groove work can be obtained by a ground worm actuating on an accurately cut worm wheel.

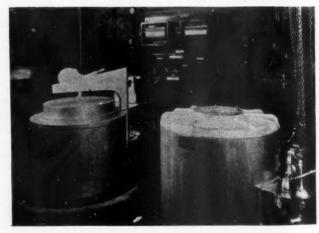
Relief grinding on taps and spiral flutes is also possible. Transverse motion is supplied through self-adjusting hydraulically actuated clutches which give extremely smooth reverse action.

The machine is powered by a 2-speed A-C motor and 12 speeds are possible through belt and pulley changes. A back gear which doubles the number of speeds is also available.

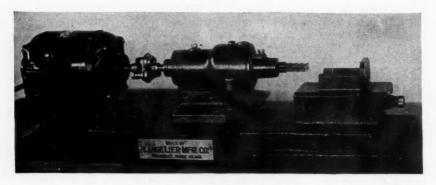
Reed-Prentice Corp., Worcester, Mass., is the manufacturer.

Langelier Machine Drills 7 Holes in $\frac{1}{2}$ in. Circle

A bench-type multiple spindle drilling machine has recently been developed by the Langelier Mfg. Co., Providence, R. I. In the automotive field the machine has been used successfully for drilling vent holes in hydraulic shock absorber pistons. Six of the 3/32-in. holes are drilled on a circle only ½ in. in diameter. The seventh hole, of the same size, is drilled in the center. A feed lever operating through a rack and gear segment is provided.



Lindberg gas-fired Cyclone furnaces (left) and screwtype pot furnace (right)

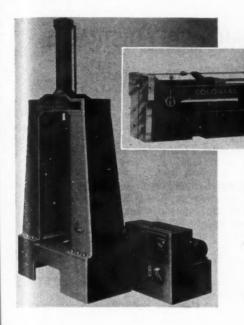


Langelier multiple spindle drill

New Screw Type Furnace Has Long Flame Travel

Increased heating efficiency made possible by greatly lengthened flame travel is the outstanding achievement of a new type Pot Furnace in which the combustion chamber is constructed in the form of an internal screw. The continuous flame, originating from a tangential firing device at the top, makes a minimum of 2½ turns around the charge before exhausting at the bottom.

The new screw-type models, manufactured by the Lindberg Engineering



(Above) Colonial's new "Universal" pull type machine, adaptable for either internal or surface broaching. Capacity up to 20 tons.

(Left) One of a complete line of power presses in the new Colonial line

Co., 221 Union Park Court, Chicago, Ill., supplement the line of Cyclone gas or electrically fired furnaces introduced some time ago by the same company. In the Cyclone type large volumes of air, heated in auxiliary chambers, are circulated directly through the charge by large capacity blower-type fans.

bination of welded steel and cast iron construction. All units are operated through individual motor drives and all models have extra large coolant tanks and pumps. Ways are of hardened and ground steel; rams are of semi-steel and of exceptionally rigid construction. In some cases, variable speed controls

dual drum vertical surface broaching machines, three types of vertical internal broaching machines, a horizontal "Universal" model adaptable to either internal or external broaching, and a horizontal high speed pusher for broaching small parts. In addition there are heavy and light duty power presses and sharpening machines for surface-broach and cylindrical-broach.

Hannifin Packless Valve For Central Air Control

A new and improved type "packless" air control valve operating on the manifold principle has recently been announced by the Hannifin Mfg. Co., 621-630 S. Kolmar Ave., Chicago. The purpose of the valve is to control any number of air or hydraulic operations from a single point.

Employing a minimum number of parts, the valve has no packing whatsoever. The bronze disks are said to form a perfect seal and when worn can be renewed by a simple relapping process.

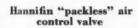
While the base of the Hannifin valve is a single piece, it can be supplied with any number of controls, either with or without shut-off positions. Inlet and exhaust ports are at the ends and piping can be arranged in the simplest manner.

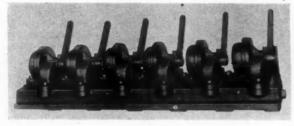
Piston Oil Hole Drill Handles 1000 Per Hour

Two of the largest car manufacturers in the industry have recently installed batteries of a new piston oil hole drilling machine built by Rehnberg-Jacobson Mfg. Co., Rockford, Ill.

The machine comprises two, twospindle drilling units and an indexing dial. In operation, the tender fits the pistons on pins in the indexing dial,

(Turn to page 193, please)





Colonial Features Popular Priced Broaching Machines

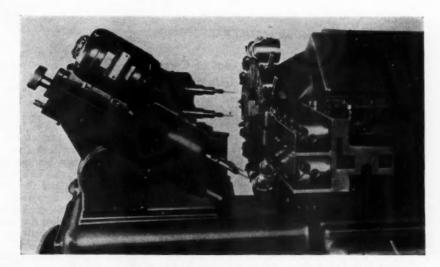
A complete line of unit-type standard broaching machines and equipment, operated hydraulically, comprising 11 basic types in 49 different models has been announced by the Colonial Broach Co., Detroit. The line is designed to cover practically the entire field of broaching, eliminating the necessity for most special designs, although the company will continue to design and supply special machines where needed.

Among the unusual features of the line is the ability to change machines over easily from one size to another in the event of production changes. Another of the features is the attention given to progressive line production broaching. For instance, it is possible to mount several single ram broaching machines on a single base with continuous feed fixtures.

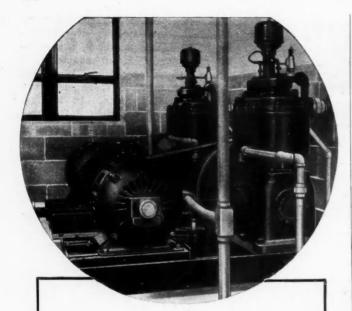
The entire line is featured by a com-

are standard equipment. In most cases automatic lubrication is provided.

Included in the line are single and



This piston oil hole drill has automatic action except for loading



Proven Economy

CURTIS COMPRESSORS

Actual operating records prove that Curtis compressors provide dependable air service at a minimum cost. Curtis' 82 years' engineering experience is reflected in this unusual economy, the result of such design features as:

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- Carbon-free Disc Valves
- Centro-ring Oiling
- Fully enclosed
- All parts readily accessible
- Capacities up to 360 CFM

Let us send you the proof of Curtis economy. Write for Bulletin C4B and surveys giving facts and figures on actual records of Curtis installations.

CURTIS PNEUMATIC MACHINERY CO.

1917 Kienlen Ave., St. Louis, Mo. NEW YORK • CHICAGO • SAN FRANCISCO

CURTIS

COMPRESSORS . AIR HOISTS

AUTOMOTIVE ABSTRACTS

(Continued from page 186)

position of this inlet cam is controlled by one or two barometric bellows. A single one, sensitive to the pressure in the inlet manifold, is sufficient for engines without supercharger, but for engines with a high degree of supercharge a second bellows is provided, sensitive to the atmospheric pressure.

M. Lauret's work was done on a stock engine, and type tests showed an increase in power of 5 per cent and a decrease in consumption of 4 per cent, as compared with operation on a carburetor. It is hoped that when the engine is better adapted to operation with fuel injection, still

better results will be achieved.

Also included within the scope of the investigation made by M. Ziembinski is a system of heavy-fuel injection developed by the inventor Rochefort. A characteristic of this system is that the fuel is subjected to an energetic "brewing" system, some of the charge being passed through the cylinder twice. After being introduced into the cylinder a first time, the charge is partly returned into a special chamber maintained at a temperature of 400-475 deg. F., where it remains during a complete engine cycle, and where

the fuel therefore is completely vaporized.

The charge injected into the cylinder, after the latter has been filled with fresh air, is composed partly of this prepared gaseous mixture and partly of the new charge of liquid fuel delivered by the injection pump. Injection takes place during the compression stroke, and toward the end of the stroke a certain portion of the charge is returned again to the special chamber. The injection of carbureted gas begins 50 deg. after bottom dead center in four-stroke, and 80 deg. after bottom dead center in two-stroke engines, and in each case continues until 60 deg. before top dead center. Fuel injection takes place over 20 deg. at the beginning of gas injection, the fuel being injected into the passage through which the special chamber communicates with the combustion chamber. At the conclusion of gas injection, during about 35 deg., the return of a part of the gas takes place, and then follows ignition of the charge in the combustion chamber by electric spark, some 20 to 25 deg. before top center. It will thus be seen that M. Rochefort directed his principal effort toward the atomization and vaporization of the fuel. In an aircraft engine he obtained a m.e.p. of 112 lb. per sq. in. and a consumption of gas oil varying between 0.57 and 0.62 lb. per hp-hr. This comparatively low efficiency was to be expected, in view of the fact that the charge enters the cylinder at a relatively high temperature, and the compression ratio therefore must be kept down.

An attempt is now being made to use gasoline and other liquid fuels of low cetane value, in high-compression engines. If these fuels were to be used in engines operating on the Diesel principle, all of the troubles inherent in ignition lag, such as knocking, smoke, bad odor of the exhaust, "freezing" of piston rings, would have to be put up with. In order to overcome this difficulty, a French concern specializing in the manufacture of pumps and injection equipment, has decided to develop the following process: In order to assure a high efficiency, pure air is compressed in a ratio of between 10 and 13. The fuel is injected toward the end of the compression stroke, but to obviate troubles resulting from ignition lag, ignition is accomplished at the very beginning of the injection by means of an electric spark. This seems to be a quite logical solution of the problem and the first practical results of the development work will be awaited with interest.

The use of the spark plug as a means of combating ignition lag has also suggested itself to "pure Dieselists," such as the designer of the American Deschamps engine. If this development succeeds it will introduce a new difficulty in the classification of engines.—Journal of the Society of

(French) Automobile Engineers.

New Developments

(Continued from page 191)

the pins carrying drill bushings so that the drills are guided accurately all the way through. Two pistons are drilled at a time by means of the two, two-spindle drilling units which are mounted at suitable angles. The first operation takes care of the upper hole in the piston pin boss of two pistons, while the second finishes the lower hole when the piston is at the lower end of the dial. Pistons are ejected automatically when in the horizontal position.

This machine is fully automatic except for loading. Productivity is about 1000 pistons per hour.

Bumper Absorbs Shock In Four Directions

The recently organized Safety Cushion Bumper & Mfg. Co., Detroit, has started production of its new type safety cushion bumpers which are ready for the market in four models, designed for passenger cars, trucks, buses and trailers.

Instead of functioning merely as a "push" and "pull" bar attached to the frame as in the usual style, the new type, it is claimed, obtains maximum safety by application of the principle of four-way distribution of shock.

Both ends of the specially tempered steel front bar are held in place by a slotted casting affixed to the secondary bar. Thus these ends are free to move outward slightly upon impact. Strategically located between the front and back bar are two recoiling C-springs whose ends are likewise contained in similar slotted castings which are



Safety Cushion Bumper



Five Steels comprise this group:—Marvel, Colonial No. 3, Choice, Hotform and Extrude die steel. Each steel has its characteristics, which makes it particularly adaptable to produce best, under varying hot-working conditions. A booklet of technical data is available on this group.

VANADIUM-ALLOYS STEEL CO. LATROBE, PA.

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affixed to the front bar. These ends are also free to move upon impact. The function of these four movable spring ends is to dissipate a large percentage of the force of any frontal impact in four directions—left, right, up and down

Tests of the safety cushion bumpers by Prof. F. J. Linsenmeyer, director of the School of Mechanical Engineering at the University of Detroit, are said to have demonstrated their ability to absorb and dissipate a large percentage of the force of a shock instead of allowing it to pass directly through to the frame.

MECHANICS II

French Protest Tax

THE automobile industry and trade in France are protesting strongly against the high taxes on gasoline. These include the import duty of about 40 centimes per liter, a number of surcharges on the import duty, the interior tax of 20 centimes per liter, the road tax of 50 centimes per liter, a Liquid Fuels Office tax and various other small taxes, the sum total of these various taxes being 1.51 francs per liter, or about 38 cents per U. S. gallon. The high cost of motor fuel is said to be one of the reasons why the

number of foreign motorists entering France decreased from 1,668,830 in 1930 to approximately 600,000 in 1935.

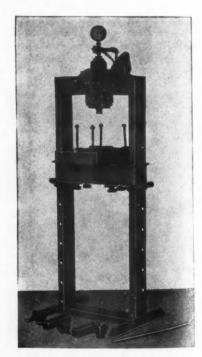
Junkers Adopts Fuel Ignition on Two-Cycle Engines

Fuel injection has been adopted for Junkers two-cycle gasoline engines with the object of achieving a reduction in the specific fuel consumption, lightening the powerplant and-in the case of aircraft engines-reducing the torque impulses. The engine which has been designed for direct injection of gasoline is a six-cylinder type of 2.36 in. bore and 3.47 in. stroke (of each piston), and it is said to develop 200 hp. at 4,000 r.p.m. The displacement is 183 cu. in. That it is relatively very light may be judged from the fact that the output is more than 1 hp. per cu. in. displacement (actually 1.1 hp. per cu. in.). The injection system is similar to that employed on Junkers Diesel

Remco Press Features Novel Construction

A 20-ton Remco hydraulic press, recently introduced, features important construction details. The head is a one-piece malleable casting. Top frame, cylinder and oil box are also cast as a single unit eliminating the usual joints. Two adjustable pins, instead of four, support the table and a cup is provided to catch any leakage past the ram.

Manley Products Corp., York. Pa., is the manufacturer.



20-ton Remco hydraulic press

Built as only "MECHANICS" can build

With complete confidence you can specify Mechanics Roller Bearing Universal Joints and Shaft Assemblies as standard equipment. "Built as only 'Mechanics' can build" means more than a quarter-century of experience in the universal joint business-designing, manufacturing, inspecting, testing, servicing products of the highest quality. As a result, Mechanics Roller Bearing Universal Joints are simple, reliable, durable, and economical. All of their parts having any appreciable effect on balance are machined all over. Integral keys, instead of screws or bolts, transmit driving torque. Ample provision is made for easy lubrication. Assembly is simple. Mechanics Roller Bearing Universal Joints are used in leading passenger cars, trucks, and busses for the main drive, in steering gears, for driving air compressors, generators, fans, and for other purposes. Investigate. Write, today, for complete information on Mechanics Universal Joints.

MECHANICS UNIVERSAL JOINT DIVISION Borg-Warner Corp. 1301 18th AVE., ROCKFORD, ILLINOIS

Gnome-Rhone Radial Aircraft Engine

(Continued from page 189)

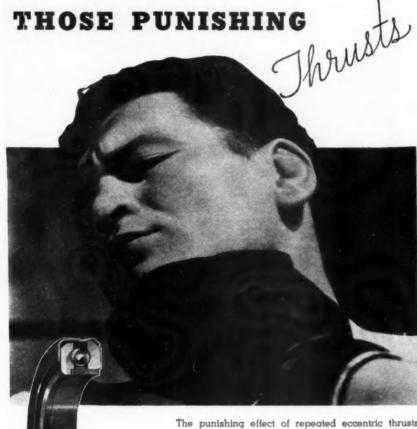
of forged duralumin completely machined. The crankshaft, which is of the built-up type, has two main bearings, and as the joints of the crankshaft are in the central long crank arm. it is possible to use one-piece connecting rods, that is, rods without separate

Cylinders differ considerably from those of the older engine, however, the number and surface area of the cooling fins being materially larger. The pitch of the cooling fins is about 0.160 in, on the barrel and 0.200 in, on the cylinder head. All cylinder bores are nitrided. The timing gear also has been considerably changed. A single cam drum is supported in four bearings, the pushrods of one bank being offset with relation to those of the other. This made it possible to treat the timing gear like two independent gears for two nine-cylinder radial engines, providing the cams with four lobes and using a single disk or drum revolving at one-eighth crankshaft speed. Timing gears are arranged back of the cam drum. The rocker mechanism is of the same type as that of the 14-cylinder, but incorporates a number of improvements, including automatic lubrication of the rockers by the reciprocating motion of the pushrods, which has a pumping effect and forces oil directly to the rocker bearings, and to the rods. Rocker brackets are held in position by a single nut and even those of the rear bank can be dismounted without taking down the cylinder. The rocker housings are held in place by a wire bail. The reduction gear at the forward end is remarkably compact, which is said to be due to the use of straight-toothed planetary pinions.

The rear section of the crankcase is of entirely new design, being integral with the crankcase itself; it comprises the volute of the centrifugal supercharger, the carburetor elbow, and the charger. It follows that what is referred to as the admission cover encloses only the blower drive gears.

The supercharger is of an entirely new design. Its centrifugal clutches are fitted with anti-friction bearings and the centrifugal weights are re-

roller bearing in front and a plain bearing at the rear. Every effort was made to render the housing leakproof. Special oil guards prevent the entrance of oil, and their effectiveness has been rear bearing for the rotor of the super- further enhanced by the provision of a number of vents, which latter help with the cooling of the plain bearing. In the rear cover there are two more drives than in the previous model, one of which may be used for an air compressor and the other for a vacuum pump. The two oil pumps are now tained in a simple groove. The rotor, in a single unit, so arranged that it of forged duralumin, is supported by a can be readily dismounted.



4600 SCHUBERT AVENUE CHICAGO

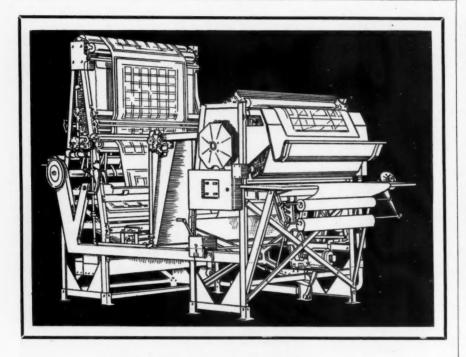
DETROIT OFFICE 7310 WOODWARD AVENUE The punishing effect of repeated eccentric thrusts sooner or later "knock-out" even the most rugged of ordinary clutch release bearings. That is why Aetna's unique "T" Type Clutch Release Bearing has won the spontaneous preference of the automotive industry. Eccentric thrust simply can't take place in this revolutionary bearing, for its patented T" shaped ball retainer permanently maintains true alignment between raceways, thus assuring a quiet, trouble-free long life. Further, this "T" feature imprisons the original lubricant "for life," obviating further lubrication as well as the necessity of costly machining operations for oil fittings. And of course with these advantages go the high quality in materials and workmanship you would expect in a bearing made by the world's largest clutch release bearing manufacturer. Investigate. Write for complete engineering data.

With a bore and stroke of 146 by 180 mm. (5.75 by 7.08 in.), the engine has a displacement of 3308 cu. in. It works with a compression ratio of 5.5. The official ratings are 1300 hp. at 5250 ft. (bench test), 1360 hp. at 9200 ft. (flight test) and a maximum of 1400 hp. at sea level for taking off. All outputs were obtained at 2150 r.p.m. The weight of the engine is 1560 lb., which makes the specific weight 1.15 lb. per hp. on the basis of the intermediate rating. The overall diameter of the engine is 55½ in. and the overall length, 57 in.

Speedoiler Has Three-Position Control

FROM C. & S. Clementson, Malmo, Limhamn, Sweden, we have received a pamphlet describing the Speedoiler, a device for supplying lubricant to the engine via the inlet manifold. It is provided with a three-position control valve by means of which the rate of oil supply to the engine can be regulated. In the central, closed position of the valve, communication with the oil tank is shut off. This prevents oil from

draining back into the tank and assures an immediate supply when the engine is started again. Of the two other positions, one is for normal operation and the other for starting, when oil is fed to the manifold at a more rapid rate. The oil used with the Speedoiler, known as Speedoil, is said to contain chemicals that neutralize the acids which are formed when the engine is operating at low temperatures, thereby preventing the so-called corrosive wear of the cylinder bore. The pamphlet referred to is printed in Swedish and English.



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Yet The Purchase Price Is \$1000 Less

Here is a high-grade Continuous Blue-Printing, Washing and Drying Equipment that will amaze you by its performance—surprise you with its extremely low initial cost and economical operating expense.

Model "II" was built to do a job—a good job—and it does that job remarkably well wherever it is installed. It turns out high-grade

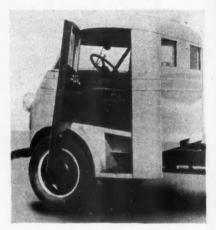
blue-prints, negatives, blue-line and brown-line prints rapidly and at low cost per square foot.

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THE C. F. PEASE COMPANY 835 NORTH FRANKLIN STREET CHICAGO, ILLINOIS

PEASE MODEL "11" MACHINE

Body-Builder Makes Chevrolet Conversion



Cab-over-engine conversions are being made on Chevrolet chassis by the Montpelier Mfg. Co., Montpelier, Ohio. The engine is shrouded to accomplish the camel-back.

Rapid Grinding of Carbide Tools

(Continued from page 180)

by the manufacturer directly after the carbide tip has been brazed to the steel shank. Such tools require complete grinding on all surfaces at the cutting end of the tool, and ordinarily to grind a tool % in. x 1¼ in., for example, would require from one to two hours. Under the new procedure, a tool this size can be completely conditioned in 4½ to 7 minutes.

This greatly reduced grinding time is also found to be of benefit in the case of carbide tools chipped through accidental abuse. Fig. 3 shows a tool of this kind (size ½ in. x ¾ in.) chipped to a depth of about 3/16 in. Frequently a tool in this condition might be considered a total loss and scrapped, due to the excessive amount of time required



Production of rails by the Controlled Cooling process at a Bethlehem Steel Company plant. The electric magnet in the foreground is lowering a group of rails into a box where they will cool gradually. The rails in the background are cooling on the hot-beds preparatory to the box treatment.

Another forward step by Bethlehem

IN THE laboratories and mills of Bethlehem for the past seven years there has been developed a research project of significance to all industry. The immediate result of this effort is the production on a commercial scale of Controlled Cooled rails which do away with that invisible enemy of rail structure, namely, transverse fissures.

Rail failure resulting from transverse fissures is peculiarly insidious because it occurs internally and ultimately causes complete breakage of the rail unless detected in advance by special devices for track inspection. This type of rail failure has been growing in recent years due to the increased demands of heavier rolling stock and greater speeds.

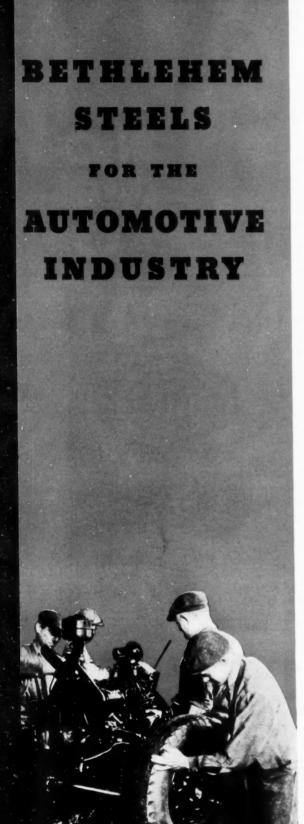
Transverse fissures are internal breakages in the rail structure, caused by minute shatter cracks which are sometimes found in rails cooled on the hot-beds in the

ordinary way. This is now remedied by taking rails from the hot-beds at an elevated temperature and reducing their temperature gradually.

This improvement is not only useful for the specific purpose of transportation, but it is significant of the continuous contribution by steel metallurgists in the production of better steels for the new demands of industrial progress.

Bethlehem's large research and metallurgical staff enables the company to be of assistance to the steel consumer throughout the entire range of commercial steel products. Not only in rails, but likewise in plates, alloy steels, wire, sheets, structural materials and elsewhere the Bethlehem personnel and facilities are constantly developing improved products for the progressive developments in many fields of industry.





ALLOY STEELS

A CLOSE liaison that has been long maintained by Bethlehem with automobile metallurgists plays its part in the production and development of Bethlehem Alloy Steels. They consistently meet an ever more insistent demand for lighter, stronger metals, essential to more dependable and economical automotive transportation.

While Bethlehem Alloy Steels bring greater strength and durability, this close-working relationship with the industry has also often been of assistance in developing properties that simplify heat treating, facilitate machining or effect other economies.

TOOL STEELS

EVERY detail in the manufacture of Bethlehem Tool Steels is handled in the way that long experience has shown to result in the finest product. For each of the many exacting toolsteel uses in the automotive industry there is a grade of Bethlehem Tool Steel that will meet every demand.

SPECIAL-PURPOSE CARBON STEELS

Efficient metallurgical control in melting and heat-treating as well as accurate control of rolling temperatures give Bethlehem Carbon Steels suitability to a wide range of responsible tasks. Special-Purpose Carbon Steels, as Bethlehem makes them, have strength and fatigue-resistance combined with easy machining qualities that make them the logical steels for an increasing list of automotive applications.

STAINLESS STEELS

Bethadur and Bethalon cover practically every requirement for stainless steels, including the free-machining grades.

AUTOMOBILE SHEETS AND STRIP

BETHLEHEM'S new continuous sheet, strip and plate mill, now in production, considerably broadens he scope of this company's service to users of flat-rolled steel.

Embodying all the latest refinements in rolling and finishing equipment, this new unit places Bethlehem in position to meet every requirement for sheets and strip, coiled and flat, including cold-rolled sheets for automobile doors, hoods, panels, and other major body sections; lamp and crown-fender stock; and a full range of both hot-rolled and cold-rolled strip.

The new mill is at Lackawanna, N.Y., in the Buffalo district—a location from which convenient, quick shipment can be made to principal centers of steel sheet and strip consumption.

SILVERY MAYARI ALLOY IRON

A NATURAL nickel-chromium pig iron with a high silicon content, offering a simple, economical method of making fine-grained machinable alloyiron castings.

STEEL WIRE

BOLT and screw wire; spoke wire; spring wire.

ROLLED SECTIONS

Special rolled sections developed by Bethlehem can be used with decided savings in the manufacture of a wide variety of parts. The use of these sections, many of which have been designed for automotive parts, has brought economies to many manufacturers.

BOLTS AND NUTS

Bethlehem's large, self-contained Lebanon Plant is devoted wholly to the manufacture of bolts, nuts and related products, and produces a complete range of standard items, and many "specials."



BETHLEHEM STEEL COMPANY

to recondition. Using the latest, improved technique it is stated that this tool can be completely reground in about 3 minutes.

The demonstrations of this latest procedure revealed several features which are important factors in making possible such drastic reductions in the time required for grinding carbide tools. These are: (1) The proper dressing of grinding wheels for rapid grinding, (2) the maintenance of constant motion of the tool while grinding, (3) the use of double or composite angles in the tools, and (4) alternate grinding on the carbide tip and steel shank when necessary to hog off large amounts of stock, as in the case of chipped carbide tools.

Another Type of Ball Bearing

A NEW group of ball bearings which combine internal self-alignment with double grease-shield protection has been introduced by the Fafnir Bearing Co., New Britain, Conn. They have been developed primarily to meet requirements of the aircraft industry but are adapted also to other uses.

The new bearings are of the doublerow type, the two rows of balls operating on a spherical race surface on the outer ring to provide inherent selfalignment for shaft misalignment up to 10 deg. The double metal shields are joined to the outer ring, and maintain a minute but constant clearance from the inner ring at any position of self-alignment.

As in other Fafnir bearings of the double-shield type, the new units are supplied prepacked with lubricant. Rings and balls are of S.A.E. 52100 steel, and rings are cadmium plated on exposed surfaces for corrosion resistance.

Two bearings of this type are now

Fafnir self-aligning double-row ball bearing

available from stock. The DKS-3 has a static radial non-Brinell capacity of 900 lb. and a static thrust non-Brinell capacity of 190 lb. Capacities for the larger DKS-4 are 1100 lb. and 240 lb. respectively.

ACCORDING to The Times of Lonciety of Great Britain has had discussions in recent months with various tractor interests, and it is understood that a committee is proposed to supervise a scheme of tractor testing at the Institute for Research in Agricultural

Engineering at Oxford. Details as to the character of the tests and the date the scheme is to be put into effect are still to be settled. It seems that what is contemplated is something similar to the tests being made at the University of Nebraska. The Nebraska tests owe their importance to a state law, which makes it impossible to sell tractors in Nebraska until they have been submitted to an official test. It is evidently intended to give the Oxford tests a similar standing by inducing the Royal Agricultural Society to sanction and supervise them.



1200 Hp. Zeppelin Engines

(Continued from page 184)

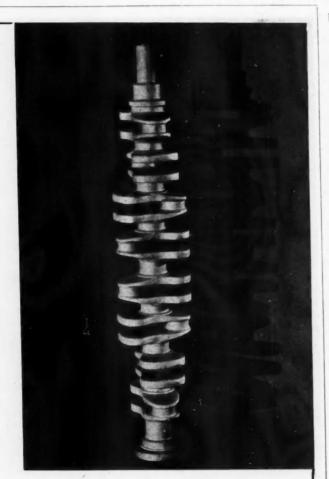
was considered essential to eliminate all unnecessary complications, the 16-cylinder form was decided upon. An analysis, moreover, showed that the torsional vibration characteristics would be better in the 16- than in the 12-cylinder. Connecting rod bearings on the crankpins are of the roller type. Whereas the crankcase of the 12-cylinder engine was of magnesium alloy, that of the new engine is of Gamma-Silu

min, a special aluminum alloy containing considerable silicon. In the order for the new engines the limit on the fuel consumption at cruising output of 800-900 hp. was set at 0.40 lb. per hp.-hr., but the actual consumption is said to be less than this even at the maximum output of 1200 hp.

The crankcase casting has numerous longitudinal cooling fins at the bottom, and vertical stiffening ribs between each pair of adjacent cylinders on the upper section (from the mounting flange up.) The crankshaft has nine main bearings and is provided with

counterweights. Journals are hardened, and the connecting-rod bearings are of the roller type. Cylinders are of steel and are water-cooled. The precombustion chambers are arranged centrally, in the cylinder heads, in accordance with the regular Daimler-Benz practice. There are two inlet and two exhaust valves in each cylinder head. The valve mechanism on top of the cylinders is enclosed and the tappet rods are provided with protective sleeves. Pistons are of a light alloy and are provided with insets of Niresist to better withstand the high temperatures.

Dry-sump lubrication is used, oil being drawn from each end of the oil sump by a separate pump and returned to the oil tank by way of an oil cooler. A main oil pump draws oil from the tank and forces it through a filter directly ahead of the engine, into eight plunger pumps, each of which supplies one of the main bearings. Four Bosch injection pumps are fitted with four pump units each. The engine is reversible, reversal being effected by shifting the camshaft by means of compressed air. Early dynamometer tests, in which torsiographs were applied, showed that the torsional characteristics of the engine were substantially in accordance with the calculations and that no vibration damper was required. The tests further showed that throughout the normal operating range, up to 900 hp., the fuel consumption is below 0.375 lb. per hp.hr. In each of the engine nacelles there is an air bottle of 1% cu. ft. capacity, designed to carry air at 3000 lb. per sq. in., which is used for starting and reversing of the engines. Each of the engines carries a two-stage compressor by means of which the air bottles are pumped up in regular operation. To facilitate starting in cold weather, provisions are made to preheat the cooling water and the lubricating oil in separate circuits.-A.T.Z., April 25.



Forgings with a background-

Behind every Wyman-Gordon forging stands diligent scientific examination of every bar of steel—continuous laboratory control of all processes.

WYMAN-GORDON

Worcester, Mass.

Harvey, Ill.

Detroit, Mich.

The Horizons of Business

(Continued from page 181)

statesmanship he and the President occupy opposite ends. The only miracle which Alf Landon will be called upon to perform when he enters the White House is the one that confronted Hercules when he appeared at the Augean stables.

Words we will have and perhaps, campaigns being what they are, we must have them. But the real issue is one of personality. Which personifies the mood of America today, Franklin Delano Roosevelt or Alfred Mossman Landon?